NEW-YORK FARMER,

AND

AMERICAN GARDENER'S MAGAZINE.

VOL. IX.] PUBLISHED MONTHLY, AT NO. 13 NASSAU STREET, NEW-YORK, AT THREE DOLLARS A-YEAR, IN ADVANCE. [No. 2.

D. K. MINOR, Proprietor.] FOR FEBRUARY, 1836. [NEW SERIES—VOL. IV.

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STATE HISTORICAL SOCIETY
816 STATE STREET
MADISON, WISCONSIN 53706

☞ *The number of the New-York Farmer consists of two sheets—the postage therefore is three cents for any distance under, and five for any distance over, one hundred miles.*

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NEW-YORK FARMER.

FEBRUARY 1, 1836.

Brownville, Jefferson Co., N. Y., Feb. 26, 1836.

To D. K. Minor, Proprietor New-York Farmer:

Dear Sir,—Herewith you have my check on the Bank of America, for six dollars, the amount of my subscription for the New-York Farmer, for the years 1836 and 1837. Please credit my account accordingly, and accept the above as the most significant mode in which I can express my entire approbation of your labors in the department of agriculture.

Very respectfully, yours, &c.,

E. K.

Better evidence than the above will not be asked from any patron. To say that we are grateful for the kind liberality of the writer, would, by no means, express our feelings. We hope to express them through the increased usefulness of the Farmer.—[PROP. N. Y. F.]

For the New-York Farmer.

TOBACCO.

In passing through East Windsor, in Connecticut, in December last, I was surprised at the size of many of the buildings erected and used for the purpose of drying tobacco; and at the extent to which I was informed their cultivation of this plant was carried. I was told that one hundred acres cultivated with tobacco the current year in that place, averaged a produce of 2,400 lbs. to the acre; and that fourteen acres out of the hundred yielded 2,800 lbs. to the acre. The price at which it sells this year, is from eight to ten cents per pound. The cultivation is understood to be half more expensive than Indian corn; and the sale is always prompt. Peculiar advantages are enjoyed in this place from the immediate vicinity of very large gin distilleries, with extensive "piggeries" annexed. The hogs are fed upon the refuse grains, and great quantities of the most valuable manure are in this way furnished. It is lamentable enough, indeed, that so much of human food, designed, by a beneficent Providence, for man's nutriment, comfort and luxury, should be converted into the certain and fatal means of his ruin, wretchedness and infamy; and that so much of human labor and care should be wasted on the production of a weed absolutely useless, and too often, in the incitement which it gives to habits of drinking, a remote but equally certain cause of moral evil. As curious facts, however, in the agricultural history of the country, they deserve to be recorded; and the morals involved in the question we submit to every man's conscience, as a topic in a measure foreign from the particular objects of this journal.

Having no personal experience in the cultivation, we have gathered the following remarks from intelligent persons engaged in it.

Tobacco is sown in a nursery bed, and transplanted as cabbage plants in rows, two feet apart in the rows; and the rows far enough apart to admit of cultivation by the plough, say three feet. It is important to get it transplanted early, so as to harvest it early; as it would be injured by the frost; and the earlier it ripens, the more yellow and bright will be its appearance, which renders it much more marketable. The ground on which it is raised should not be wet, but dry and rich. It bears and requires copious manuring; more than Indian corn.

When in flower, the seed vessel is to be broken down; and afterwards the suckers, which come out between the leaves and the stalk at the joint, are to be plucked off; and the worms, which are the greatest enemies it has to contend with, are to be picked off by hand. They resemble the poplar worm. When it begins to turn yellow, the plants ear to be cut up close by the ground; and after wilting one day, are to be hung upon poles under cover, until they become dry; and then they are to be plucked and tied in hanks, two leaves tied with a third, and thus prepared for sale.

The stalks, which remain, are used as manure, either spread upon the young wheat and rye in the autumn, with very great advantage, or cut in pieces in the spring and put into the corn hills. The average crop is about 1,500 lbs. 2,000 lbs. are not uncommon to an acre; and it sells from five to seven dollars per 100 lbs. This account was given me by a respectable farmer of Long Meadow, Massachusetts, five years ago, who cultivated the plant to some considerable extent. The price has since that time advanced, and the cultivation of it been extended. H. C.

January, 1836.

For the New-York Farmer.

ON THE CANADA THISTLE.

Mr. Editor,—Of all noxious plants, there is one well calculated to keep the farmer in mind of that most ancient denunciation ("Thorns and thistles shall it bring forth.") It is also well calculated to try the patience of the most forbearing. It is the one, of all others, which has most baffled the ingenuity of man to subdue; the one of which the most has been *said* about its extermination, and most *written* about its eradication, and the least DONE about its total destruction. I need not say it it is called the Canada Thistle, (or "*Serratulla arvensis*" of Linnaeus.) So various are the opinions of practical farmers in relation to the best mode of conquering it, and so positive are many that it can be done in no other manner than the one prescribed by themselves, that a casual observer might be justly led to suppose there could be no possible way of effectually doing so. But, in taking into full consideration the different modes of destroying this pest to the agricultural world, as set forth by the several writers on this *prickly subject*, we are led to observe in their several statements one simple fact, that is, it is kept from growing and seeding. Now, whether it is "cut in the moon," or mowed in the earth, or salted, ploughed, or spaded or hoed, beat down or pulled up, whether the ground is in sward or under tillage, if it be *kept* down it *must* die; so say different ones, so say I. There is one grand principle, alike applicable to this and to all other plants: that is, if plants in their growing state are kept constantly divested of their leaves, or if, for a given length of time, they are deprived of a due proportion of atmospheric air, they cannot long exist. Then if the thistle is not allowed to grow, it must die. Following up this general principle, any of the foregoing methods, *thoroughly* persevered in, would produce the desired effect. But men are generally so tenacious of their own opinions and practices, that they are not willing to allow full credit to those of their neighbors. Different men, in different ways, have destroyed Canada thistles. Each declares to the world his particular manner of doing it, in sincerity and truth; and it is not right or seemly in his next door neighbor to deny, or, without *full* experiment, to doubt that truth.—And here it may not be amiss for one to testify to what he has seen: I once saw a piece of Canada thistles of more than an acre totally destroyed by once ploughing. The circumstances were these: Passing the field where they were, I observed the owner ploughing, being very careful to avoid the thistle ground. The earth was exceeding dry and hard, not having been moistened with rain for several weeks. I observed, you had better plough those thistles, for 'tis a pity to lose the use of so much valuable land; said he, it will only spread them the

more; for I well remember the first thistle that made its appearance on this spot, and by ploughing they have extended to this; but notwithstanding, at your request, I will plough it once more. He did so, and pretty deep; and from that day to this not a Canada thistle has been seen there. This was performed during the last days of June.—From this success I was led to plough a piece at home, expecting like results from like operations, but was sadly mistaken; the season being a wet one, did not in the least check them. Thrice did I plough them, with little or no success; the field was sowed to wheat; they grew up with it till they were nearly ready to blossom. There came a heavy rain; I took with me three men, and went through the field, containing in all three acres or more of thistles, and pulled every one that could be found. They came up very easy sometimes from several inches below the surface of the ground. A few stinted ones might have been observed at harvest, though none to interrupt the binding. This field was ploughed the October following without reference to the thistles; the next spring it was again ploughed and sowed with barley. A few scattering stalks were observable where the thistles had grown bountifully the preceding year; these were carefully pulled up as before. In the fall this field was once ploughed and sowed with wheat, and at the harvesting not one thistle could be found.

Again; in a pasture field, containing nine acres, there were as many as four acres of Canada thistles; for experiment sake, as soon as they made their appearance in spring, I commenced by sowing salt upon them broad-cast, while wet with dew or rain, at the rate of one quart to the square rod, generally about eight qu rts at a time, and so on till the different patches were salted; this answered for salting all the cattle grazing in that field, which kept the grass and thistles gnawed close, without disturbing the grass roots. The cattle fed more upon the salted places than in other parts of the field, after the apparent savor of the salt had disappeared. For three seasons I followed this course, and on the fourth not one made its appearance, nor do I think they will again renew themselves when the field is ploughed. It is truly astonishing and even painful to any farmer who has the least desire to see good and clean farms, that, while passing through almost any section of our country, he is obliged to notice fields, some with a few small patches, others half covered, and others most entirely so, with this most villainous plant. While growing in grain fields it chokes and destroys that which was designed for the support and comfort of man; and if gathered into barns, its seed is deposited in the manure, and is very likely to spread over every plain on which that is scattered. If left upon the ground, its plumous seeds are seen flying in any direction with the wind, dropping with equal force and effect upon the field of him who tilleth his land and the *place* of him who tilleth it not. One man cannot remedy an evil of so great magnitude, under so great discouragements. Then let every man put shoulder to the wheel, and it *must* roll on; and let every man make a solemn vow that not one "*cursed thistle*" shall seed on his premises, and the time will soon come when one cannot be found. Let this spirit increase and prevail, and the good arising from it will soon manifest itself abroad in the land. We might soon hail a bright era in the annals of agriculture; we might soon hold a grand festival in gladness for the downfall of one of our worst enemies, and soon might we keep joyful holyday in commemoration of his death.

FARMER C———.

Jan., 1836.

For the New-York Farmer.

WOODSIDE'S REVOLVING HARROW—DEPTH OF PLOUGHING—SPIRIT FOR AGRICULTURAL IMPROVEMENTS. BY J. D. WOODSIDE.

The following communication should long since have appeared—but may, even at this late day, be of service:

Sir,—I am attached to the office of the Register of the Treasury of the U. States. A portion of my duty as a clerk was to record Inventions Patented. In doing which, I perceived many improvements offered in the plough, &c. &c.: this led me to remark that no improvement had been made in the Harrow; and having somewhat of a mechanical turn of mind, I concluded there was much room for improvement in that implement, and accordingly set to work to devise a new method of harrowing, or more properly speaking, of pulverizing the earth. It affords me pleasure to state that yourself and very many others have borne testimony to the valuable improvement which I have made in that implement.

After having tested my improvement, and giving it the name of Revolving Harrow, I concluded I might also make some improvement by sowing the grain from the cart to which the harrow is attached, and flatter myself that the method devised will prove far superior to that of sowing by hand, so that I now call the implement Revolving Harrow and Seed Cart, calculated to sow the grain, harrow it in, and cast it into drills of 2½ inches apart at one operation. Since having patented my invention, I have been at much expense in travelling with the implement, and have discovered to my surprise a great want of agricultural spirit wherever I have been, say from Albany, N. Y., to Norfolk, Va. It is a fact that our farmers, generally speaking, forget the old adage that, "that which is once well done is twice done." And it is astonishing to me that nineteen out of twenty are averse to deep ploughing, for, I find the average depth to be five inches, and in many instances not four, particularly on the eastern shore of Maryland. The reason assigned by many for shallow ploughing is, that they are afraid to bring to the surface the clay soil. In my humble opinion, I would say plough six inches deep, clay or no clay. Would it not be wiser to cover the good soil by bringing the clay on the top, so that it would be protected from the heat of the sun, and the roots of the grain which naturally shoot downwards will then come in contact with a soil far better calculated to nourish them than that of the clay which they cannot penetrate, and which in shallow ploughing they must inevitably have to contend with. Another reason which I would suggest in favar of turning the clay soil on the surface is, that the heat of the sun, the atmosphere and rain, &c., will have a tendency to convert it into a soil of some nourishment. I am persuaded that any soil will be soon worn out by shallow phoughing, or more properly speaking, by skimming over the surface as is generally done. There is in my opinion a very wide field open for improvement in agriculture. The common harrow or drag, moving no faster than the horse which propels it, is poorly calculated to pulverize the earth, and it is the poor opinion I have ever had of the implement, which caused me to view it as a half-and-half kind of an article; its effect on the earth I consider very deceptive, as it leaves the surface fair to the eye, so much so that farmers are apt to think the work is well done, when at the same time beneath this smooth surface there are clods without number hid from their view. This cannot possibly be the case with my Revolving Harrow, which certainly pulverizes the earth honestly, or, in other words, as deep as the ground is ploughed. In using the drag for turning in grain, a great quantity is lost by the number of clods which are upset on clusters that cannot move the clo nor force their way through it. I am decidedly of opinion that 8 bushels of grain turned in with my Harrow will produce more in the crop than 10 put in with the drag. And why? Because the earth is well pulverized, and the grain uniformly sown in drills, which admit of a circulation of air calculated to prevent the stalks from mill dew.

I have remarked that those who are the least indebted are the best cultivators, as they are compelled in a measure to make the most of what they possess. Having witnessed the effect of the drag very closely since my Harrow has been in operation, and without the least disposition to boast of my improvement in harrowing, I do say that the *drag is* a drag, and not a Harrow; but my Revolving Harrow, which revolutionizes every thing it comes in contact with, may with propriety be called a Harrow.

Permit me to remark, that I have recently received a letter of some length from the President of an Agricultural Society at Easton, on the eastern shore of Maryland, who appear to take great interest in any im-

provements in agriculture, having offered me every facility in their power to get my improved Harrow introduced among the farmers in that neighborhood. In my reply to that letter, I could not refrain from tendering my thanks to the Society for the encouragement offered therein. When travelling through the country, I looked for and expected to find Societies established for the benefit and promotion of agriculture, but found none until I received the very welcome letter which I did from the Hon. Robt. H. Goldsborough, President of the Society above alluded to. It is true there are many Societies formed on paper which prove of but little benefit.

The foregoing remarks I hope will prove of some service in having a tendency to revive the spirit of agriculture, which not only interests the farmer, but the community at large. ("Bread is the staff of life.")

Respectfully, your ob't servant,

JAMES D. WOODSIDE.

Washington, Jan. 17th, 1835.

For the New-York Farmer.

WEEVIL IN WHEAT.

Columbia, Pa., Feb. 26, 1836

D. K. MINOR:

Dear Sir,—Your favor of the 2d inst. came to hand in due time. I am pleased to hear that you are not discouraged by the late disaster, but determined to continue your publications with renewed energy, and hope you will be enabled to arise from the ruins with increased success.

I here inclose $5 for Mr. I. L. Wright and myself, which will pay both copies for the year 1836—my own being paid in part for the current year; and as you desire me, I will endeavor to give you my "notions" and experience on a subject of considerable interest to farmers. The following you may publish if you consider it worth a place in the Farmer; if not, I move that it be laid on (i. e. under) the table, and I shall be equally satisfied.

Respectfully, yours, &c.

J. B. G.

As wheat is considered the "staff of life," not only in the middle States, but over the greater part of the civilized world, and as the crop, as well as the grain, has to contend with many enemies before it becomes food for man, it may possibly benefit some cultivators of that grain to know how to avoid some of the evils attending it. I shall say nothing at present of the rust, the mildew, blight, the worm, nor yet of the fly, though this latter made, last fall, dreadful ravages in this part of the country, and the prospects for a crop this year are not very encouraging.

I shall for the present confine myself to the weevil. If one single farmer, whose barn is infested with weevils, should be benefitted by this communication, I shall be fully compensated for my trouble.

The weevil, it is well known to all who are troubled with it, is a small winged insect, which perforates the grain in the mow, before it is threshed from the straw. Farmers, as well as writers, differ in opinion as to the habits of this insect. Some affirm that the parent insect, or fly, as they term it, (our weevil has wings, but I doubt whether it has ever been seen to make use of them,) deposit their eggs on the grain, while yet in a growing state in the field,—and recommend, to prevent the eggs from hatching, to kiln-dry the wheat, or to keep it in a situation too cold for the eggs to vivify. Others recommend salt to be sprinkled on the straw while stacking, spreading elder bushes, fumigating with sulphur, &c. &c. Now all this is worse than useless, except salt, which improves the straw, for the weevil that infests the wheat in this section of country; how it may answer at the South, we know not. There evidently appears to be a difference in the insect known by the same name,—ours never attacks *Indian corn*, as the Southern weevil is said by some to do. For want of more congenial food, it will live on barley and oats, but is *known* not to propagate its species in the latter grain; it is also well known never to attack grain in stacks, at some distance from the barn. It is of no serious consequence in mills, as we might be led to believe, from the quantity of grain constantly stored and carried there from infected barns; but the truth is, although it may frequently be seen in mills, it is unable to continue its species, for want of that fermentation and heat in grain and straw, which appears to be so necessary to its propagation.

Some twelve or fourteen years ago, our barn was infested with weevils, increasing for two or three years to a prodigious extent, so much so, that, in cleaning our wheat, full one twentieth part was left with the chaff, by the windmill or fan, and the remainder was light, considerably below the standard weight. Necessity compelled us to adopt some means for their destruction; and as the plan proved eminently successful, I will communicate it for the benefit of others similarly situated. Early in the summer, some time in May, I believe, we removed all our *wheat* and *rye straw* from the barn, gave it a thorough cleaning, and so left it remaining until fall. Our *wheat and rye was all stacked in the field*, oats taken to the barn immediately. Some time in October, *after the fermentation* was over, we hauled it into the barn; this plan we adopted for two years, for fear of some of the enemy still hiding in the walls, though after the first year we saw no more of the weevil. But in the autumn of the first year we placed pumpkins in one of the stables to feed to cattle, and when the pumpkins were all used, we *shovelled the weevils on the wheelbarrow*, and took out *two or three loads*, the moisture of the pumpkins having attracted them where they all died!

My own opinion is, that they are at first carried by means of straw, grain, bags, or in different other ways, from a neighboring barn or mill; that during the winter and spring they remain in the walls or foundation of the building; that as soon as the grain is carried to the barn, they commence the work of "increasing their kind;" that the heat of the grain and straw, during fermentation, (which is well known to be very considerable,) vivifies the eggs laid on the grain by the parent; that the young insect immediately commences the work of destruction by entering the kernel and eating its way as it enlarges in growth, until nothing is left but the hull or skin of the grain; it then emerges, a perfect insect, either to continue to reproduce and destroy, or to remain in its present shape until the following year, the parent insect dying annually. Different expedients are frequently made use of for thinning their numbers—such as flooding, by directing a stream of water, or during a heavy shower of rain, to enter the foundation of the building; this must be done in spring or early in the summer. By placing a few sheaves of grain in different parts of the barn a week or ten days previous to bringing in the main crop, and daily destroying the insects that gather on these sheaves, thus millions may be destroyed,—quite enough, however, will be left to oblige you to attack them again the following year. The only certain way of destroying them appears to be, as above stated, either to starve or prevent them from breeding.

As my barn is infested again with them, after being clear for 10 or 12 years, I shall make use of the above expedient once more the coming summer. I am confident of success.

I will add a list of the hottest and coldest day in each year, since 1828. I might enlarge this, but have no room.

FAHRENHEIT'S THERMOMETER.

Observations for heat are taken at noon, and for cold early in the morning.

	Time.	Heat.	Cold.
1828	July 26,	99°	
1829	Jan'y 2,		2° belew zero.
	Sept. 2,	98°	
1830	Feb. 9,		3° above zero.
	July 24,	104°	
1831	Jan. 25,		10° below.
	July 25,	96°	
1832	Jan. 27,		7° below.
	July 7,	102°	
1833	March 3,		3° above.
	July 27,	97°	
1834	July 26,	100°	
1835	Jan. 5,		22° below.*
	July 8,	98°	
1836	Feb. 3,		13° below zero.

J. B. G.

* Coldest day ever known here. This, however, does not give the hottest summer, nor coldest winter. The present winter I consider colder than the last, although the mercury did not fall so low within 9°, but the cold is more continuous.

The following communication has been a long time on hand, having been accidentally omitted in the December number. We now submit it to our readers.

For the New-York Farmer.

INQUIRIES.

By H. Strait.

1. Will the electric, galvanic, or magnetic fluid, by being suddenly sent through cream, or by being suddenly drawn off of it, convert it into butter?

2. Which would be most powerful in its action on cream, an electric, galvanic, or magnetic machine?

3. Is the conversion of cream into butter a chemical or mechanical process?

4. What temperature is the best for the conversion of cream into butter?

5. At what temperature will cream rise best on milk?

6. Will any of the acids, by being put into cream, cause it to become butter, by its chemical action, without injuring any of its qualities?

7. Will any of the ethers, by being put into cream, cause it to become butter, by its chemical action, without injuring any of its qualities?

8. Will any of the alkalies, by being put into cream, cause it to become butter, without injuring any of its qualities, by its chemical action?

9. Will any of the oils, by being put into cream, cause it to become butter, by its chemical action, without injuring any of its qualities?

10. Will any of the salts, by being put into cream, cause it to become butter, by its chemical action, without injuring any of its qualities?

11. Will any of the metals or minerals, by being put into cream, cause it to become butter, by its chemical action, without injuring any of its qualities?

12. What is the cause of butter's coming by mechanical agitation sooner at some times than others? Is it owing to temperature alone?

13. Is there no single substance or combination of substances single, that, by being put into cream, will bring butter by their chemical action?

14. Will a piece of butter, put into cream when it is churning, tend to hasten or hinder the time of its coming?

15. Will cream rise on milk sooner under an exhausted receiver than in the open air?

16. Will rennet, by being put into cream when it is prepared to churn, bring the butter alone, or assist in its coming, and not injure any of its qualities?

17. Will boiling cream, under an exhausted receiver, or in one, convert it into butter, or assist to do it, and not injure any of its qualities?

18. Will boiling cream in an open receiver convert it into butter, or assist to do it, and not injure any of its qualities?

19. Will not the throwing cream through small apertures in jets, very powerfully against some smooth flat surface, convert it into butter far quicker than by churning it?

20. What kind of mechanical agitation (strong, weak; swift, slow; constant or intermittent,) will convert cream the quickest into butter, and not injure any of its qualities?

To Experimenters. Milk is a dark white, mildly sweet and mildly aromatic fluid, secreted by mammiferous animals in glands, to nourish their young. Milk consists of cream, curd or cheese, and whey. Cream is the unctuous, yellowish dark, white and fine-flavored fluid that rises and stands on new-set milk. By agitation or churning it assumes a solid form, and becomes butter. When agitated or churned, its temperature rises three or four degrees; it absorbs oxygen and generates acid. It can be converted into butter by agitation under an exhausted receiver. When it is separated from its milk, the milk soon sours, and gradually separates into curd, or cheese and whey. Curd or cheese is a white, insipid, inodorous, and elastic substance, soluble in the alkalies, particulaly hartshorn, but insoluble in water. Rennet converts milk into curd, or cheese and whey. Whey is the yellowish fluid left after the cream and curd or cheese is separated. From the fact that rennet can so act on milk as to separate its curd, I infer that there must be some substance whose effect on it by chemical action, will bring butter. Now all that remains is to discover that certain something, either single or compound, which will so act on milk, or at least on cream, as to separate the butter, and not injure any of its qualities. How can it be discovered? Could but this one question be answered, the deed, the desired deed, would be done. Experience and experiment are our only instruments. They must be used, faithfully and fairly used, or probably the discovery will never be made. Can it be made? Why not? There's reason for it. If reason's for a thing, nature's for it too. Reason must first rally to the standard of truth, then experiment and success will attend their united effort. Above, I have embodied all of importance at present known on the subject. From the small flame now kindled, must be kindled all the fuel that we can bring and burn to give light upon it. The cause and effect of the matter must be thrown into the balance of reason, and weighed. Every thing has a cause. Every cause has an effect. Cause and effect are balanced. Cause balances effect. Effect balances cause. Divide them, and they die. Unite them, and they will revive. If cause is understood, effect can be understood. If effect is understood, cause can be understood. To add or take a grain from any one of two things perfectly balanced, destroys their balance at once. If two mountains were balanced, lay a grain on one and not on the other, and the balance at once is destroyed. Yes, so nice as this it is. Now, rennet acts in such a manner on milk as to become the cause of coagulating it; but the how, ah! the how bids defiance to all the fires of philosophy. It straightens every sinew of reason to discover the truth; often, but too often, the gigantic genius of man is withered in its studies to overtake the littlest whies in life. I now offer my inquiries to experimenters. I wish them to be tried. There are many that can experiment, and but few that can invent. I can invent, but from means, not ability, cannot experiment. Could I, (the first philosophers only do it,) I would live the life of an inventor and experimenter. Separate, the former wants genius, the latter gold; and it is almost as rare as two suns, to see genius and gold shine at once in the same firmament. The inquiry is honorable, and its object useful. It is to concentrate to a point all that is known upon it; and from the concentrated light on that point, to reflect it in some such a way as to multiply its power on whatever it falls within its sphere, so as to render every thing diminutive as distinctly visible as the most obvious objects. Co-operation can only effect it. The cause must be equal to the desired effect, or it will infallibly fail. Cool, calculating, and circumspect must he be that never errs in economy, but how much so more, that never errs in experiment. Experiment is the tribunal-bar of our reason, before which no witnesses can be suborned, no judge be prejudiced, and no jury unjust. The only verdict that can be given is truth. I anticipate the time when butter can be brought from cream, perhaps even from new milk, with a little less than the twentieth of the present labor.

New-York, Oct. 13th, 1835.

Mr. Minor:

Sir,—I have been expecting to see some notice in your paper of the fine heifer and her calf exhibited by you, or to you, in Wall street, last summer. It was said, at the time, they were equal, if not superior, to the imported cattle of the same age, and of the same breed. It was also asserted that the calf was every way superior to the one you was so careful to mention and describe, as having been sold by Henry Clay. I should be glad, if you have his dimensions and age, to see them published, that we may compare them. If we have any thing calculated to exalt our State in the cattle line, I see no good reason to conceal it. It was said the heifer never had been fed upon any other food than hay and grass. If you know any thing of the facts, please state them, and oblige A Subscriber.

The expectations of "A Subscriber" were just and reasonable. It was our intention to give an account of the beautiful animals referred to by "A Subscriber," but, for some cause, not a very *reasonable* one, we admit, as it must have been forgotten, amongst our numerous other engagements—it was at the time omitted. If "A Subscriber" will furnish a description, we will give it a pro-

minent place, and if he will furnish a correct drawing, we will procure an engraving, to accompany the description.

SAXONY, MERINO, AND SOUTH DOWNS—AGAIN.—This controversy, like another of far more consequence, which recently agitated this community, and which seems as likely, as for a time that did, to be continued, and, as far as we can perceive, with as little benefit to the parties.

The history of it is as follows:—An article was published in the Cultivator for April or May last, comparing different breeds of sheep, in which comparison the Saxons were spoken of as inferior in some respects to the Merinos and South Downs. Mr. H. D. Grove considered the comparison as unjust to the breed, and injurious to him as a prominent breeder of Saxony sheep, and therefore replied through the New-York Farmer to the communication of R. in the Cultivator. R., in turn, considers himself aggrieved, calls upon us to publish the *cause* of complaint, and also a reply to Mr. Grove. At the time we could not lay our hand upon the original communication, but published the rejoinder of R. to Mr. Grove. We now give the communication R., which led to the controversy, which we intended long since to have done, and a letter from Mr. Grove.

If this controversy should cause either breed of sheep to be more highly appreciated, we shall be amply compensated for the space devoted to it.—[ED. N. Y. FAR.]

From the Cultivator.

QUERIES AND ANSWERS, IN RELATION TO SHEEP HUSBANDRY.

The five queries which are quoted below, came from an anonymous correspondent. They were forwarded to a gentleman pre-eminently distinguished as one of the best judges of stock, and withal an extensive breeder, who has promptly and very obligingly furnished us with the subjoined answers.

1. "*Of what breed or stock had a beginner better compose his flock, his object being the growing of fine wool?*" Pure Merino, crossed with high bred South Downs.

2. "*What are the prices at which the Saxony, South Down, Cotswold, Leicester, Bakewell, or Merino ewes, can be purchased respectively, after shearing?*" From a *good* flock, you cannot *select ewes*, or it would not long remain a good flock; lambs or yearlings may be selected perhaps—price very various—depending on purity of blood, and individual excellence.

3. "*What breed produces wool of the greatest value?*" Saxony *per pound*—Merino *per fleece*. "*And what breed yields the heaviest fleeces?*" The great Lincoln, or Romney Marsh Sheep.

4. "*What breed is most hardy and best adapted to our climate?*" South Downs, *certainly.*

5. "*On what lands how many sheep per acre can be profitably kept?*" That depends on the breed of sheep, and quality of land, but much fewer than are generally kept.

The Saxon sheep undoubtedly produce the finest wool; but their fleece is light, seldom exceeding 2 1-4 lb. in weight, and is too open to resist our storms. They are feeble in constitution—require great care, are poor nurses, and their lambs are raised with difficulty. The mutton from such sheep must necessarily be of a miserable description.

I believe that in Connecticut, even the pure Saxony sheep may now be purchased at a comparatively low price, say from six dollars to four dollars a head, and perhaps lower still.

The *old fashioned pure* Merino sheep, which were imported by Col. Humphrey, and those associated with him, (but which are now almost extinct,) were a much better constitution sheep, and *more* than made up by quantity for the difference in the quality of their fleece—the close, thick texture of their wool resisted our cold wet storms—their lambs were much easier raised, the ewes were better nurses, and on the whole, I am convinced they are a much more profitable sheep than the Saxony. I must, however, remark, there are several varieties of the Spanish sheep; and I would carefully avoid the "gummy"* family fleece, which, however, must not be confounded with that which, though of a dark color, contains only the grease necessary to render it impenetrable to the weather; the former being very objectionable to the manufacturer, while the latter is readily cleansed and worked.

I desire to be understood as speaking of the *pure* breeds, and not of *grade* sheep, which so universally abound in this State, for *they* have no distinctive or fixed character, but vary with their degree of consanguinity to the pure imported blood. Indeed I feel well assured that there are very few individuals of the pure unmixed blood to be found.

The earlier merino flocks of this State, were obtained from the introduction of imported bucks, and those were purchased at great prices, which, with the native ewe, formed the ancestry of our fine wooled flocks: these had not attained nearly to the excellence of the pure merino, in the staple of its wool—its compactness—its uniformity, or softness, when the Saxony cross was introduced, and became almost universal in a surprisingly short time—and this is the true history of almost all our fine grade sheep in this State. It is not, therefore, to these flocks that I allude, when I speak of *pure* merino, or Saxony sheep.

As to price, I presume such merino sheep are more costly now than the Saxony! from the fact that farmers are now aware of their error in using the Saxon cross, which has ruined the constitution of their flocks, decreased their clip of wool nearly one-half, and reduced their produce, until, with ordinary management, more than twenty-five lambs to an hundred ewes, are seldom raised. A merino buck, of *unquestionable* purity, whose ancestry were both imported, will now sell for twenty-five and thirty dollars; the same animal, eighteen months since, might have been picked up at $8 and $10.

The Leicestershire, Bakewell, and Cotswold sheep are so crossed and mingled in this country, that the distinction is lost, excepting to the practised eye, who can find individuals in the various flocks which partake, as it may happen, more of the characteristics of the one parent or the other.—These are a long, coarse wooled sheep, possessing much beauty of form, early maturity, and are quick feeders; but they require rich lands for their pasture, and though their constitutions are good, yet their fleece is sufficiently open to admit the penetrating rains of our severe storms, and then it is, that their heavy fleeces are seen separated along the ridge of the back, thus admitting the wet directly to the skin, until the animal is chilled through. They are good nurses, and make fine lambs; their meat originally coarse and long in the grain, and white in its color, was much improved by Mr. Bakewell, and under his management, became superior to the other large, long wooled sheep. Some of the best flocks of this variety may, I believe, be found in the sheep folds of Mr. Dunn, and Mr. Wilkinson, in Albany county, or of Mr. Adcock, Mr. Musson and Mr. Clark, in Otsego county, all of whom have given much attention to this fine variety of sheep. Average produce in wool, I should think, from five to six pounds, though individuals are found, carrying fleeces of ten and twelve pounds! Price of good lambs, I believe, from ten to fifteen dollars.

The South Downs are as yet but little known in this country, but in my opinion, are decidedly better calculated than any other, for the domestic purposes of our farmers. They are of a medium size, beautiful in their forms, large loined, broad chested, fine in the head, small boned, and fine in the fleece, which averages 4 lbs. in the ewes; the bucks reach to 7 lbs.; in quality it is equal to half blood merino, but stronger in its filament, and *entirely* impenetrable to storms of snow, sleet, or rain; they are regardless of our coldest weather, and possess hardier constitutions than any sheep I know. The wethers attain to about 28 lbs. per quarter, and are allowed to be the best mutton sheep in England, the meat being dark in color, short grained, mild in flavor, and juicy. They are excellent nurses, and quick feeders. Here again, I beg to be understood as alluding to the *pure* and *high bred* South Down; such as it is found in the sheep-folds of the great sheep-masters in Sussex; not the common, unimproved animal of the Downs, weighing 14lbs. per quarter, and carrying but 2 1-2 of wool.

As to prices—they are best ascertained from the sources of the respective breeds, and must vary much, according to the *established purity of the blood*, and the excellence of the individuals; the one a much more difficult point to ascertain than the other.

For the last three years, preparative to commencing my own flock, I paid much attention to the sheep husbandry of this district; visited those who owned large flocks,

* The term "gummy" is in common use with farmers, and will be understood.

and soon discovered that they were all on the decline; I corresponded with others, and found the introduction of the Saxony blood was universally followed by a decline of constitution, and all its attendant evils; excepting in one instance, where a gentleman wrote me, that he had just purchased a flock of Saxon merinos. He assured me that in Oneida county, they were a hardy, healthy sheep—shearing on an average about 3 lbs. of wool, *and the purer the Saxon blood, the heavier was the fleece!!* This was so contrary to my own experience, having materially injured a flock of nearly two thousand grade-merinos by one single cross of the Saxony, that I still continued my plan of forming a flock from the *pure, full bred,* large merino sheep on the one part, and from the high bred sheep of Mr. Ellman's flock of South Downs on the other. Assisted by the indefatigable perseverance, acute discrimination, and previous knowledge of a friend (whose father was concerned with Col. Humphrey in his various importations and sales of such sheep,) I collected, after 18 months' search, about thirty full bred merino sheep, pure as imported, *known* to be directly descended from those importations. Their quality of wool is as fine as perhaps any grade Saxony flock around me. The ewes will average 4 lb. fleeces. My South Downs I imported from the celebrated flocks of Mr. Ellman, in England, whose two year old wether sheep beat all England last Christmas, at Smithfield, and took the first prize. He was judged to weigh 32 lbs. per quarter; and I am happy to say, has been presented to me by Mr. Ellman, as a specimen of excellence, and will probably arrive in this country before long, as he was to be shipped from London the first week in this month, for New-York. From Mr. Ellman, I procured six yearling ewes, and a *yearling* buck; the ewes have wintered in a yard with an *open* fence, and an open shed, closed only at the back; they lambed *there* from the 23d to the 28th of February, on which day the thermometer was as low as 4 deg. On the 1st, 2d, 3d, 4th and 5th of March, the thermometer, in the shade, was from zero to as low as 6 deg. *below* zero, at sunrise! and yet my lambs, young as they were, never suffered in the least from the severity of the cold; they never showed the slightest consciousness of its intensity! and are allowed by all who call to see them, to be the finest lambs they ever saw. I find a rapid demand for all I can spare from both my flocks, at liberal prices. The engagements for my South Down buck, for *next* season, have been filled for some months past; and two days since Mr. Musson, a Leicestershire breeder, called to see him, when I took the opportunity of requesting he would weigh him—he very obligingly did so; and his exact weight was one hundred and fifty-nine pounds and a half. I have ventured on these minutiæ in regard to the *high bred* South Downs, as these sheep are very little known in the United States; and facts are more satisfactory than opinions: and again I must insist that I do not allude to the *unimproved* breed; I do not allude to the South Downs of Cully's day, from whose writings I have seen various extracts as descriptive of the breed, nor do I include the Hampshire Downs; I confine myself to the *high bred sheep* of the present day; and if any would oppose to them the fast rooted prejudice of high breeding being inseparable from delicacy, I would refer them to the facts above stated, and ask of them a personal inspection. I would further add, that it is an acknowledged fact, that Mr. Ellman's flock turns out more lambs than ewes! averaging 750 lambs annually, for several years, from 600 ewes.

A strong advocate myself for purity of blood, and a known line of ancestry, which confers excellence by descent, still, I believe, for this country, the most valuable description of sheep may be raised by judiciously crossing the merino and South Downs, thus uniting the fine fleece of the one with the beautiful carcase of the other, and gaining at once a constitution suited to our climate. This was done some years since, on the introduction of the merinos into England, and was attended by the most flattering success, the flock beating every other for the COMBINED excellence of wool and carcase. Both these breeds being fine, close wooled sheep, there is no extravagant dissimilarity, no wide contrasts to be amalgamated, and a more uniform character is easily obtained in the progeny, from which it will do to breed again. This is not the case with a cross between the long and short wooled varieties; the first cross will sometimes make a good animal, but when bred from again, the produce is uncertain, sometimes "taking back" on the long wooled parent, and sometimes on the opposite side; and when apparently combining in the fleece a united influence of the two breeds, a closer examination will show an unevenness of length and filament that ill suits the manufacturer. R.

Maple Grove, Otsego, March 26, 1835.

To the Editor of the New-York Farmer:

Sir,—Although I have delayed replying to your correspondent R., I may, notwithstanding, be permitted, at this late day, to make a few remarks on his article in the November number.

It is obvious that R. endeavors to impress the reader with the belief that my Saxony sheep require every possible care and attention, like tropical plants, in our climate, in order to make them live; but that *his* merinos require little or no care and attention, and they will do well!—that the success myself and others have had in raising Saxon lambs is exclusively owing to the superior care bestowed upon them, but that *his* Merinos are so hardy as to need but little care, and yet raise their lambs. In short, every thing is artificial with the Saxons. I think far otherwise!

In a former communication, I think I have satisfactorily shown that the Saxons are good nurses; and I will now endeavor to show that, in one respect, at least, the Merinos and Saxons do not differ much, if any; for the same principle which operates on the Merinos to raise their lambs holds also good with the Saxons. The Merino ewe must have sufficient food in order to nourish her lamb before it is yeaned, or the lamb will come poor and weak, and the dam be without milk. And, in the second place, she must have food enough, and of such quality as to create milk, after the lamb is yeaned. If these essentials are wanting, she will drop her lamb, and does not seem to care much for it, and often leaves it as soon as it is dropt, and of course, the poor little thing must soon perish for want of nourishment. And precisely the same rule holds good with, and applies to, the Saxons. If, on the other hand, the ewe is well fed, she can nourish her lamb, it will be strong and vigorous when lambed, and the dam having plenty of milk, will not leave, but stand over and take good care of it, and there is then but little danger of her not raising it. I will only refer your readers to last spring, when hay was very scarce, and the season very backward, so much so, that little or no grass could grow during the months of April and May; consequently, the ewes could not sufficiently nourish their lambs before they were yeaned, and after they were yeaned, the dams had little or no milk for them, and being without nourishment, the lambs were left to perish. This was the universal complaint, in many sections of the country, and some lost as many as 50 per cent. I suffered with the rest; but notwithstanding the many discouragements, I raised, of 102 lambs, 87—which are all alive, as yet, and in good order, proving any thing but the Saxons "*poor nurses.*"

There is one idea in R.'s article which I have never heard of or seen before, which deserves a passing notice, and to which I demur. It is this: *that the higher bred the Saxon sheep, the lighter their fleece.* If he means the *purest* blood and the *oldest* ancestry, I beg leave to say, he is mistaken; for the highest bred sheep in Saxony are the king's private flock, and others descending in a direct line from them, and kept perfectly pure; these do not present such results, as I can attest from personal observations. If his theory is correct and holds good, then the pure Saxon, or the pure Merino, or any other pure breed of sheep, will diminish in quantity of wool in proportion as they are higher bred, and run the risk of being entirely fleeceless in the end. Might not, with the same propriety, his theory, if true, be applied to cattle—to the excellent high-bred short horns—and does any one who possesses such cattle, by breeding higher, run the risk of running them down into a diminutive animal? As it regards Saxon sheep, my experience on this point, is in opposition to R.'s theory, and that, by judicious breeding, the Saxon fleeces do not depreciate in quality or quantity, but on the contrary, are improving in these essentials, and in size also.

Far, therefore, from believing *that the higher bred, the lighter the fleece*, I have determined upon importing a few more *high bred* Electoral sheep from Saxony, which I expect will arrive in the ensuing spring, and thus be enabled to breed still higher.

Fam, however, happy to learn from brother R., that the South Downs sheep, which, in England, it is said, even *Mr. Ellman's high bred*, are not very hardy, but "DEFICIENT IN VIGOR and CONSTITUTION," have, under his treatment, become very hardy—that in a yard with "*an open fence, and an open shed, closed only at the back*," when "*they lambed there from the 23d to the 28th February, on which day the thermometer was as low as 4 degrees*," and when, "*on the 1st, 2d, 3d, 4th and 5th of March, the thermometer, in the shade, was from zero to as low as 6 degrees* BELOW *zero, at sunrise! and yet* HIS *lambs, young as they were, never suffered in the least, from the severity of the cold, they never showed the slightest consciousness of its intensity.*" If the South Downs can, by skill, so readily be changed, under R.'s treatment, from "*deficiency* in vigor and *constitution*," into a hardy constituted sheep, I hope he will, for the benefit of the public, communicate the *manner* of his treatment, which produced such sudden change.

The opinions which I expressed in my article in the July number of the Farmer, I still adhere to, and believe them supported by facts. I thought R.'s article in the May number of the Cultivator, was calculated to do me serious and unmerited injury, and I think so still. I defended myself from the unjust attacks which R. saw fit to make upon the Saxon sheep generally, (and of course it included mine,) and leave the reader to judge whether "*R. or Grove has written great stuff or nonsense.*" Under this impression, and to place the subject fairly before the public, I requested you to publish my article above referred to, and I now appear with another to presume upon the columns of the New-York Farmer, and request you to be kind enough to lay it before your readers, which I hope you will not deny.

The mistake that I made in my figures, and of which I was not aware till after I saw it in the publication, was unintentional, and was so obvious that I thought every reader would have come to that conclusion, without laying the stress upon it that R. does. I am, however, perfectly willing to be corrected in this as well as in any other mistake.

In conclusion, I beg leave to state, that my estimate of 2¾ lbs. wool per head from my *grown* ewes, is by no means exaggerated. My actual clip of 2 lbs. 6½ oz. consisted of 85 fleeces from lambs—65 from grown ewes, suckling lambs—45 from yearling ewes, suckling lambs (with the exception of 8 dry ewes), and 5 bucks from one to three years old, and instead of 80 cents per pound, as I quoted from the price current in the May number of the Cultivator, my wool, last summer, was worth 110 cents per pound, and could have got 112½ cents before delivery.

The account, therefore, will stand thus:

My grown Saxons, 2¾ lbs. per head, at 110 cents per lb.,	$3 02½
R.'s Merinos, 4½ lbs. per head, at 60 cents per lb.,	2 70
Leaving a balance in favor of my Saxons of	0 32½

H. D. GROVE.

Hoosick, near Buskirk's Bridge Post Office, New-York, 31st Dec., 1835.

AGRICULTURAL CONVENTION.—We have at length received the proceedings of the *State Agricultural Convention*, held at Albany, on the 8th and 9th of February. It was, we are gratified to be able to say, an assemblage of gentlemen which does credit to the State; and from which much good must inevitably result.

We have delayed this number of the Farmer several days, in order to give the proceedings of the Convention, which we are enabled to do through the politeness of Alexander Walsh, Esq., of Lansingburgh, who furnished us with the Cultivator containing them.

The Convention was opened by the appointment of Jesse Buel, Esq., Chairman, who thereupon delivered an eloquent address, in which he inculcates sound maxims and important truths, in relation to the policy and necessity of a higher system of agricultural education. We give the address, proceedings and memorial of the Convention, and ask for them an attentive perusal; believing, as we do fully, that such an education as is here contemplated, in the acquirement of which, a practical knowledge of agriculture and mechanics may also be obtained, will do more to promote the happiness of mankind, by preparing young men for usefulness, than any other system ever adopted in this country; and we indulge the hope that the Legislature now in session, will, in its wisdom and liberality, make the necessary provision for an Agricultural School, which shall become a *pattern* school for the whole Union. Let New-York, in this equally important measure, as in *Internal Improvements*, take the lead.

We have also the proceedings of the State Agricultural Society, which, however, we are compelled to defer until our next, as our columns, for this number, were crowded before the Cultivator came to hand.

AGRICULTURAL STATE CONVENTION.

At a meeting of delegates and others, from different parts of the State, in agricultural convention assembled, in the assembly chamber in the city of Albany, on Monday, February 8th, at 3 o'clock P. M.

On motion of Mr. Dickinson, of Broome, the Hon. Judge Buel of Albany was temporarily called to the chair, and on motion of Mr. Leland of Steuben, D. L. Dickinson of Broome, and J. J. Viele of Rensselaer, were chosen secretaries.

The chairman then rose and addressed the convention as follows:

Gentlemen,—Land and labor are the principal sources of public and private wealth. The more fertility we can impart to the one, and the more intelligence we can infuse into the other, the greater will be the returns they make, and the greater our means of happiness; for it is wealth, rightly employed, that enables us to multiply not only our own, but the comforts and happiness of those around us. Yet it is not a few very rich men, or very wise men, be the aggregate of wealth and talent ever so great, that give prosperity and greatness to a State. It is the general diffusion, among a whole people, among the rank and file of society, of property and knowledge, and the industry, enterprise and independence which they beget, that renders a State truly respectable and great. If this convention, therefore, can do aught to render labor more profitable and more honorable, and our lands more productive, it will effect a substantial good to society.

I venture to lay down this broad proposition, that the productions of our agricultural labor may be doubled in ten years, and trebled in twenty. In proof of this, I appeal, in the first instance, to facts which have fallen under the observation of all: to the contrast, in products and profits, which are seen to exist, between districts and farms, of equal natural fertility, and often contiguous to each other, which are under good and bad management, and the constantly increasing profits of husbandry, where the spirit of improvement has been fully awakened. We find many individuals who pay from seventy to one hundred dollars an acre for farms, getting not only the interest of their purchase money, but realizing large profits, from their agricultural labors; while we see others, equally well circumstanced, hardly getting enough to meet the contingent expenses of their families. Within the last thirty years, in many districts, particularly in Orange, Dutchess, Columbia, &c., where the natural fertility of the soil had been exhausted by the old system of depletion, and where improvement gained an early footing, the price of lands has increased three and four fold, and the products of agricultural industry in a proportionate ratio. There are other districts again, that have remained stationary in their practice, while the soil has been constantly deteriorating, because this practice has been primitive, calculated to exhaust, but not to restore fertility. The measure has been constantly sent for meal, without the meal-chest having been replenished. This has most happened where nature had been most bountiful in imparting natural fertility: man being in a measure compelled to exert his physical and mental energies most upon a poor soil. The benefits to the productive districts and farms, have been brought about by a more extended knowledge, in the cultivator, of the principles upon which good husbandry is based, by the force of competition, and examples of individual excellence. The bad

and soon discovered that they were all on the decline; I corresponded with others, and found the introduction of the Saxony blood was universally followed by a decline of constitution, and all its attendant evils; excepting in one instance, where a gentleman wrote me, that he had just purchased a flock of Saxon merinos. He assured me that in Oneida county, they were a hardy, healthy sheep—shearing on an average about 3 lbs. of wool, *and the purer the Saxon blood, the heavier was the fleece!!* This was so contrary to my own experience, having materially injured a flock of nearly two thousand grade-merinos by one single cross of the Saxony, that I still continued my plan of forming a flock from the *pure, full bred,* large merino sheep on the one part, and from the high bred sheep of Mr. Ellman's flock of South Downs on the other. Assisted by the indefatigable perseverance, acute discrimination, and previous knowledge of a friend (whose father was concerned with Col. Humphrey in his various importations and sales of such sheep,) I collected, after 18 months' search, about thirty full bred merino sheep, pure as imported, *known* to be directly descended from those importations. Their quality of wool is as fine as perhaps any grade Saxony flock around me. The ewes will average 4 lb. fleeces. My South Downs I imported from the celebrated flocks of Mr. Ellman, in England, whose two year old wether sheep beat all England last Christmas, at Smithfield, and took the first prize. He was judged to weigh 32 lbs. per quarter; and I am happy to say, has been presented to me by Mr. Ellman, as a specimen of excellence, and will probably arrive in this country before long, as he was to be shipped from London the first week in this month, for New-York. From Mr. Ellman, I procured six yearling ewes, and a *yearling* buck; the ewes have wintered in a yard with an *open* fence, and an open shed, closed only at the back; they lambed *there* from the 23d to the 28th of February, on which day the thermometer was as low as 4 deg. On the 1st, 2d, 3d, 4th and 5th of March, the thermometer, in the shade, was from zero to as low as 6 deg. *below* zero, at sunrise! and yet my lambs, young as they were, never suffered in the least from the severity of the cold; they never showed the slightest consciousness of its intensity! and are allowed by all who call to see them, to be the finest lambs they ever saw. I find a rapid demand for all I can spare from both my flocks, at liberal prices. The engage nents for my South Down buck, for *next* season, have been filled for some months past; and two days since Mr. Musson, a Leicestershire breeder, called to see him, when I took the opportunity of requesting he would weigh him—he very obligingly did so; and his exact weight was one hundred and fifty-nine pounds and a half. I have ventured on these minutiæ in regard to the *high bred* South Downs, as these sheep are very little known in the United States; and facts are more satisfactory than opinions: and again I must insist that I do not allude to the *unimproved* breed; I do not allude to the South Downs of Cully's day, from whose writings I have seen various extracts as descriptive of the breed, nor do I include the Hampshire Downs; I confine myself to the *high bred sheep* of the present day; and if any would oppose to them the fast rooted prejudice of high breeding being inseparable from delicacy, I would refer them to the facts above stated, and ask of them a personal inspection. I would further add, that it is an acknowledged fact, that Mr. Ellman's flock turns out more lambs than ewes! averaging 750 lambs annually, for several years, from 600 ewes.

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Sir,—Although I have delayed replying to your correspondent R., I may, notwithstanding, be permitted, at this late day, to make a few remarks on his article in the November number.

It is obvious that R. endeavors to impress the reader with the belief that my Saxony sheep require every possible care and attention, like tropical plants, in our climate, in order to make them live; but that *his* merinos require little or no care and attention, and they will do well!—that the success myself and others have had in raising Saxon lambs is exclusively owing to the superior care bestowed upon them, but that *his* Merinos are so hardy as to need but little care, and yet raise their lambs. In short, every thing is artificial with the Saxons. I think far otherwise!

In a former communication, I think I have satisfactorily shown that the Saxons are good nurses; and I will now endeavor to show that, in one respect, at least, the Merinos and Saxons do not differ much, if any; for the same principle which operates on the Merinos to raise their lambs holds also good with the Saxons. The Merino ewe must have sufficient food in order to nourish her lamb before it is yeaned, or the lamb will come poor and weak, and the dam be without milk. And, in the second place, she must have food enough, and of such quality as to create milk, after the lamb is yeaned. If these essentials are wanting, she will drop her lamb, and does not seem to care much for it, and often leaves it as soon as it is dropt, and of course, the poor little thing must soon perish for want of nourishment. And precisely the same rule holds good with, and applies to, the Saxons. If, on the other hand, the ewe is well fed, she can nourish her lamb, it will be strong and vigorous when lambed, and the dam having plenty of milk, will not leave, but stand over and take good care of it, and there is then but little danger of her not raising it. I will only refer your readers to last spring, when hay was very scarce, and the season very backward, so much so, that little or no grass could grow during the months of April and May; consequently, the ewes could not sufficiently nourish their lambs before they were yeaned, and after they were yeaned, the dams had little or no milk for them, and being without nourishment, the lambs were left to perish. This was the universal complaint, in many sections of the country, and some lost as many as 50 per cent. I suffered with the rest; but notwithstanding the many discouragements, I raised, of 102 lambs, 87—which are all alive, as yet, and in good order, proving any thing but the Saxons "*poor nurses.*"

There is one idea in R.'s article which I have never heard of or seen before, which deserves a passing notice, and to which I demur. It is this: *that the higher bred the Saxon sheep, the lighter their fleece.* If he means the *purest* blood and the *oldest* ancestry, I beg leave to say, he is mistaken; for the highest bred sheep in Saxony are the king's private flock, and others descending in a direct line from them, and kept perfectly pure; these do not present such results, as I can attest from personal observations. If his theory is correct and holds good, then the pure Saxon, or the pure Merino, or any other pure breed of sheep, will diminish in quantity of wool in proportion as they are higher bred, and run the risk of being entirely fleeceless in the end. Might not, with the same propriety, his theory, if true, be applied to cattle—to the excellent high-bred short horns—and does any one who possesses such cattle, by breeding higher, run the risk of running them down into a diminutive animal? As it regards Saxon sheep, my experience on this point, is in opposition to R.'s theory, and that, by judicious breeding, the Saxon fleeces do not depreciate in quality or quantity, but on the contrary, are improving in these essentials, and in size also.

Far, therefore, from believing *that the higher bred, the lighter the fleece*, I have determined upon importing a few more *high bred* Electoral sheep from Saxony, which I expect will arrive in the ensuing spring, and thus be enabled to breed still higher.

Fam, however, happy to learn from brother R., that the South Downs sheep, which, in England, it is said, even *Mr. Ellman's high bred*, are not very hardy, but "DEFICIENT IN VIGOR and CONSTITUTION," have, under his treatment, become very hardy—that in a yard with "*an open fence, and an open shed, closed only at the back*," when "*they lambed there from the 23d to the 28th February, on which day the thermometer was as low as 4 degrees*," and when, "*on the 1st, 2d, 3d, 4th and 5th of March, the thermometer, in the shade, was from zero to as low as 6 degrees* BELOW *zero, at sunrise! and yet* HIS *lambs, young as they were, never suffered in the least, from the severity of the cold, they never showed the slightest consciousness of its intensity.*" If the South Downs can, by skill, so readily be changed, under R.'s treatment, from "*deficiency* in vigor and *constitution*," into a hardy constituted sheep, I hope he will, for the benefit of the public, communicate the *manner* of his treatment, which produced such sudden change.

The opinions which I expressed in my article in the July number of the Farmer, I still adhere to, and believe them supported by facts. I thought R.'s article in the May number of the Cultivator, was calculated to do me serious and unmerited injury, and I think so still. I defended myself from the unjust attacks which R. saw fit to make upon the Saxon sheep generally, (and of course it included mine,) and leave the reader to judge whether "*R. or Grove has written great stuff or nonsense.*" Under this impression, and to place the subject fairly before the public, I requested you to publish my article above referred to, and I now appear with another to presume upon the columns of the New-York Farmer, and request you to be kind enough to lay it before your readers, which I hope you will not deny.

The mistake that I made in my figures, and of which I was not aware till after I saw it in the publication, was unintentional, and was so obvious that I thought every reader would have come to that conclusion, without laying the stress upon it that R. does. I am, however, perfectly willing to be corrected in this as well as in any other mistake.

In conclusion, I beg leave to state, that my estimate of 2¾ lbs. wool per head from my *grown* ewes, is by no means exaggerated. My actual clip of 2 lbs. 6¼ oz. consisted of 85 fleeces from lambs—65 from grown ewes, suckling lambs—45 from yearling ewes, suckling lambs (with the exception of 8 dry ewes), and 5 bucks from one to three years old, and instead of 80 cents per pound, as I quoted from the price current in the May number of the Cultivator, my wool, last summer, was worth 110 cents per pound, and could have got 112½ cents before delivery.

The account, therefore, will stand thus:

My grown Saxons, 2¾ lbs. per head, at 110 cents per lb.,	$3 02½
R.'s Merinos, 4½ lbs. per head, at 60 cents per lb.,	2 70
Leaving a balance in favor of my Saxons of	0 32½

H. D. GROVE.

Hoosick, near Buskirk's Bridge Post Office, New-York, 31st Dec., 1825.

AGRICULTURAL CONVENTION.—We have at length received the proceedings of the *State Agricultural Convention*, held at Albany, on the 8th and 9th of February. It was, we are gratified to be able to say, an assemblage of gentlemen which does credit to the State; and from which much good must inevitably result.

We have delayed this number of the Farmer several days, in order to give the proceedings of the Convention, which we are enabled to do through the politeness of Alexander Walsh, Esq., of Lansingburgh, who furnished us with the Cultivator containing them.

The Convention was opened by the appointment of Jesse Buel, Esq., Chairman, who thereupon delivered an eloquent address, in which he inculcates sound maxims and important truths, in relation to the policy and necessity of a higher system of agricultural education. We give the address, proceedings and memorial of the Convention, and ask for them an attentive perusal; believing, as we do fully, that such an education as is here contemplated, in the acquirement of which, a practical knowledge of agriculture and mechanics may also be obtained, will do more to promote the happiness of mankind, by preparing young men for usefulness, than any other system ever adopted in this country; and we indulge the hope that the Legislature now in session, will, in its wisdom and liberality, make the necessary provision for an Agricultural School, which shall become a *pattern* school for the whole Union. Let New-York, in this equally important measure, as in *Internal Improvements*, take the lead.

We have also the proceedings of the State Agricultural Society, which, however, we are compelled to defer until our next, as our columns, for this number, were crowded before the Cultivator came to hand.

AGRICULTURAL STATE CONVENTION.

At a meeting of delegates and others, from different parts of the State, in agricultural convention assembled, in the assembly chamber in the city of Albany, on Monday, February 8th, at 3 o'clock P. M.

On motion of Mr. Dickinson, of Broome, the Hon. Judge Buel of Albany was temporarily called to the chair, and on motion of Mr. Leland of Steuben, D. L. Dickinson of Broome, and J. J. Viele of Rensselaer, were chosen secretaries.

The chairman then rose and addressed the convention as follows:

Gentlemen,—Land and labor are the principal sources of public and private wealth. The more fertility we can impart to the one, and the more intelligence we can infuse into the other, the greater will be the returns they make, and the greater our means of happiness; for it is wealth, rightly employed, that enables us to multiply not only our own, but the comforts and happiness of those around us. Yet it is not a few very rich men, or very wise men, be the aggregate of wealth and talent ever so great, that give prosperity and greatness to a State. It is the general diffusion, among a whole people, among the rank and file of society, of property and knowledge, and the industry, enterprise and independence which they beget, that renders a State truly respectable and great. If this convention, therefore, can do aught to render labor more profitable and more honorable, and our lands more productive, it will effect a substantial good to society.

I venture to lay down this broad proposition, that the productions of our agricultural labor may be doubled in ten years, and trebled in twenty. In proof of this, I appeal, in the first instance, to facts which have fallen under the observation of all: to the contrast, in products and profits, which are seen to exist, between districts and farms, of equal natural fertility, and often contiguous to each other, which are under good and bad management, and the constantly increasing profits of husbandry, where the spirit of improvement has been fully awakened. We find many individuals who pay from seventy to one hundred dollars an acre for farms, getting not only the interest of their purchase money, but realizing large profits, from their agricultural labors; while we see others, equally well circumstanced, hardly getting enough to meet the contingent expenses of their families. Within the last thirty years, in many districts, particularly in Orange, Dutchess, Columbia, &c., where the natural fertility of the soil had been exhausted by the old system of depletion, and where improvement gained an early footing, the price of lands has increased three and four fold, and the products of agricultural industry in a proportionate ratio. There are other districts again, that have remained stationary in their practice, while the soil has been constantly deteriorating, because this practice has been primitive, calculated to exhaust, but not to restore fertility. The measure has been constantly sent for meal, without the meal-chest having been replenished. This has most happened where nature had been most bountiful in imparting natural fertility: man being in a measure compelled to exert his physical and mental energies most upon a poor soil. The benefits to the productive districts and farms, have been brought about by a more extended knowledge, in the cultivator, of the principles upon which good husbandry is based, by the force of competition, and examples of individual excellence. The bad

husbandry has diminished in products and profits, from the want of this knowledge, from the force of prejudice, the want of a spirit of competition, the want of system, and from culpable indolence, the natural result of the other causes. In what manufacturing or mechanic art, do we see the master prosper, who adheres to the modes and practices of his grand-father? The labor of fabrication has been abridged of one-half of its toil in these, by the discoveries of science and the inventions of genius. Nor is much less the case in agriculture, where science and skill have been pressed into its service. "Why," says a late writer, "this becomes another world to the man who opens his eyes. Science breathes life and light into it; it kindles with glory, happiness and praise; there is no one who cannot feel its inspirations if he will."

But even in our best cultivated districts, and on our best cultivated farms, the capacities of the soil to reward labor, are yet but partially developed. Art has not yet exhausted its energies upon them, and science, with gigantic strength, is coming to its aid. The value of manures, the pabulum of vegetable life, and the source of vegetable growth and excellence, will be better appreciated, their quantity doubled, and their application directed with better economy. The importance of alternating crops, on all lands susceptible of this mode of culture, which makes the grain, grass and root crops mutually subservient to the wants of each other, will be better developed in principle, and better carried out in practice. The culture of roots, which pulverize and ameliorate the soil, fatten the farm-stock and fill the dung-yard—which has been the basis of improved husbandry in Britain, and promises the best results in this State, wherever it has gained a fair footing, will be greatly and profitably extended. The properties of lime, marl and gypsum will be better understood, and these mineral substances will be made to contribute more largely to the productiveness of the soil. Labor-saving implements will be multiplied, and our farm stock will be improved in quality, and increased in numbers. Whitney's Cotton Gin doubled the value of the cotton lands of the south, and its benefits have been estimated over one hundred millions of dollars; and I state with confidence, that a single implement, Green's Straw Cutter, is calculated to save half a ton of hay in the winter keep of a horse, ox, or cow, fed upon hay. Estimating the number of horses and neat cattle at half our population, which is certainly within bounds, the saving in this machine, over that of feeding in the old slovenly way, would be at least 500,000 tons of hay in a year, which at the moderate estimate of $7 per ton, would amount to an annual saving of three millions and a half of dollars. If we estimate the labor to be saved by the general introduction of improved ploughs, harrows, cultivators, drill-barrows, horse-rakes, mowing machines, threshing machines, &c., which not one farmer in twenty has yet availed himself of, and consider the benefits of the countless new inventions which the genius and enterprise of our countrymen are likely to produce, I cannot be mistaken in assuming, under a view of all these considerations, that every tolerable acre of land, near the borders of the Hudson, may be made to produce to the cultivator, the clear interest of two hundred dollars per annum. There are thousands of acres which already produce double this income.

To strengthen the force of this conclusion, I beg leave to call your attention to the agricultural products of other countries.

Professor Low, one of the latest and best authorities for Scotch husbandry, bases his estimate of farm profits upon an annual rent to the landlord—(for Scotch, as well as English farmers, are almost invariably tenants to the nobility and gentry)—I say he bases his estimate of the farmer's profits upon an annual rent of 2*l.*, or about nine dollars per acre. He puts down the other burthens, as window and saddle horse duty, statute or highway labor, poor rates and insurance, at $141.87, for a farm of five hundred acres. Thus the Scotch farmer, upon his 500 acre farm, pays annually in rent and burthens $4,641. After deducting this amount from the products of the farm, as well as the expense of family, stock, implements, manure, labor, &c., the professor gives to the farmer, a nett income, from the products of his labor, of 399*l.* 6*s.* 2*d.* ($1,785,) amounting to 16*s.* ($3.80) per acre. If we throw out of the account the burthens and rent, which are mere nominal with us, the nett income of the Scotch farmer, clear of every expense, would average seven dollars and seventy-five cents per acre, or upon his 500 acre farm, would amount to $3,875, instead of $1,785.

The cultivated lands of England and Wales are computed at 91,000,000 of acres, and the annual product of these lands is estimated by Arthur Young, at one hundred and forty-five millions of pounds sterling, equal to six hundred and forty millions of dollars. More recent estimates put the agricultural products of Great Britain, including Scotland, at two hundred and sixty millions of pounds. Upon the first estimate we have, as the average product per acre, about $19.36. To show the burthens of the British farmers, which are an enormous drawback upon the profits of his labor, we will only quote from Arthur Young, who made an agricultural survey of the country some forty years ago, the amount of these burdens in the county of Essex, a district sixty miles long by fifty broad. The tithes amounted to 4*s.* 9*d.* (94 cents) on the acre. But I will give gross sums:

Rents, - - - -	936,320*l.*
Tithes, - - - -	225,620*l.*
Poor rates, - - -	500,000*l.*

Exceeding, in the aggregate, seven millions, three hundred thousand dollars, which the farmers of one county annually pay, to the landlords, the clergy, and paupers! And yet, says our account, with all these burdens, their profits from the improved modes of cultivation, were greater in 1805, than when the expenses were much less. Let us imitate their industry and their skill, but may we long be exempt from their rents, rates and tithes.

Let us now examine the statistical data of New-York Agriculture. The cultivated lands in our State were estimated, in 1825, at 7,160,967 acres, and their aggregate value, at the average value of $25 per acre, at $179,124,175. The farm stock was estimated to swell this amount to two hundred and twenty millions. Let us suppose, what we believe will be making a pretty fair allowance, that the farmer upon 100 acres, which, with the necessary farm stock, we will put down at $3,000, produces twenty per cent. upon this capital, or $600 a year. Deduct seven per cent. from this sum, for interest upon the capital, or for rent, and he will have left, for his labor, and family, and other expenses, $390. Upon this estimate, it will be perceived our lands do not yield one-third of the produce per acre, upon an average, that is produced upon the farm lands of England. And even the farming in England, we believe, is badly managed in many districts, and is less productive than either that of Scotland or Flanders. We certainly have the capacities, if we will call them into action, of successfully competing, in every branch of productive labor, with the population of the old world.

In recurring to the history of agriculture, we find that a century ago it excelled in the Netherlands, embracing Flanders, and in some districts of Italy, particularly in the valley of the Po. In the former of these countries, a judicious system of rotation, suited to soil and local circumstances, had been adopted; clover and roots had been introduced, and manures were sedulously husbanded and discreetly applied. In addito these improvements, irrigation had been extensively adopted in the valley of the Po. Although these countries have, during the last century, progressed but comparatively little in agricultural improvement, they nevertheless retain a degree of pre-eminence at this day, and furnish practical examples highly worthy of our imitation. So recently as 80 years ago, agriculture was in a most wretched condition, both in Great Britain and France. Most of the improvements in English husbandry have been made within the last seventy years; those of Scotland during the last fifty years, and those of France since the period of her revolution, or within the last thirty years. These improvements, which have contributed essentially to the prosperity and happiness of the human family, were brought about by the spirited exertions of a few distinguished individuals, such as Young, Sinclair, Davy, Chaptal, Bakewell, and others of minor note, though probably not less efficient; by the application of science to husbandry, and the co-operation of societies formed to promote its improvement. Among the leading features of the great practical agricultural improvement which has so recently taken place in Britain, Loudon places at the head—the introduction of a better system of rotation—the drill system of growing turnips, about 1765; the improvement of live stock, by Bakewell, about 1770; the use of lime in agriculture, and the system of convertible husbandry, which com-

menced about 1765; the improved plough, by Small, about 1790; and the threshing machine, by Merkle, about 1795; the system of draining or tapping springs, discovered by Anderson from principle, and by Elkinton, by accident, about 1765; the revival of the art of irrigation, by Boswell, in 1780; the field culture of the potatoe about 1750; the introduction of the Swedish turnip, about 1790, of spring wheat, about 1795, and of mangold wurzel at a still later period. The British Board of Agriculture, and the Highland Society of Scotland have effected much towards improvement; and perhaps no country in the world has made greater strides, at any period, in bettering the condition of her husbandry, than Scotland has, during the last half century, under the fostering auspices of the last named society, and which is dispensing its labors of usefulness, with untiring patience and unabating energy.

Although it is difficult to compare the average crops of different countries with any degree of accuracy, I will nevertheless endeavor to do it from the imperfect data to which I have had access, so far as regards some of the staple products of the soil, premising at the same time, that the comparison affords but an imperfect view of the relative amount of farm profits, the disparity in the price of labor, and the general economy of farm management, not coming under notice.

Flanders is a flat, wet, and generally sandy country, illy adapted to the wheat crop. Yet the average over 25 bushels per acre. Lowe gives the average product of different districts, in this grain, according to Radcliff, varies from 20½ to 32 bushels to the acre; mean average product in Scotland, of wheat 24, barley 42, and oats 48 bushels the acre. Loudon states the average product in Britain at 24, 28, and 32 bushels; mean average 26 bushels the acre. In 1790, Washington, in a letter to Arthur Young, computed the average crop in Pennsylvania, then one of our best wheat growing States, as follows:—Wheat 15 bushels, rye 20, barley 25, oats 30, Indian corn 25, potatoes 75. Strickland, in a report made to the British Board of Agriculture, forty years ago, gave the average wheat crop of our State at 12 bushels the acre, and of Dutchess, then, as now, our best cultivated county, at 16 bushels. An intelligent correspondent of the Baltimore Farmer, who dates Philadelphia county, expresses his doubts whether the average produce in Pennsylvania, with the exception of the potato crop, is as great as it was half a century ago. I am inclined to believe that in our State there has been a manifest improvement in that period; for, although some districts have retrograded, others have advanced with a good deal of celerity.—Well managed farms may be selected in the old river counties, where improvement has made the greatest advances, upon which the average crops have more than doubled during the last few years; where wheat has yielded an average crop of 25 to 30 bushels an acre, corn 70 to 80, potatoes 300, and other crops in proportion, and where cultivated grasses and roots have still more added to the profits of the husbandman.—The maximum produce of our grain crops may be stated, wheat 40 bushels, Indian corn 100, rye 35, oats and barley 60. In this estimate I leave out of view the fertile west, where nature has been profusely bountiful of her gifts, and where man seems to think the soil inexhaustible, and confine my remarks to the valley of the Hudson. These facts suffice to show, that while the condition of our husbandry is bad, it is susceptible of great improvement. What has been done in one district, or on one farm, may be done in others. And if we despair of the present generation to make the desired improvements, let us take care at least to qualify our sons to become better managers than their fathers.

From the estimate I have made of our agricultural products, it would seem that they amount to about 43 millions of dollars per annum. Now if this Convention can be instrumental in adding merely ten per cent. to this amount, by inducing a more profitable mode of culture, they will be instrumental in adding annually four millions three hundred thousand dollars to the capital of the State, independent of the enhanced value of the lands, consequent upon their improved culture. But if they can succeed in awakening, in our legislators, and in our fellow-citizens at large, a spirit of hearty cooperation in the work of improvement, the value of our agricultural products may be doubled. "Agriculture," says Sully, "may be regarded as the breasts from which the state derives its support and nourishment."

The inquiry next presents itself, how are these desired ends to be brought about?—We can make good farmers as we make good officers for our navy and army: Teach the pupil the science as well as the art; instruct the head as well as the hands, and subject him to system and discipline. Give us an Agricultural West Point to begin with, where may be concentrated and taught, all that is useful in theory and excellent in practice. "The education of the head and hands must always go together, or the health, strength, and efficiency of the physical and mental powers of man can never be duly developed and maintained." Raise the standard of instruction in our common schools, the nurseries of statesmen as well as farmers. Infuse into the juvenile studies of your boys the elementary principles of physical science; of those fixed laws of nature, which regulate and control matter, organic and inorganic, a knowledge of which is as beneficial to agriculture as it is to the art of war, or the healing art. Nay, there is probably not a business in life which can derive higher advantages from some of the sciences than agriculture. "It is not the arbitrary laws of man that improve the condition of man; for if they did, there has been enough of them, such as they are, to have made him perfect long ago. No—they will not do; we want the development of the laws of nature, in agriculture, manufactures, commerce, knowledge," to improve his condition, his habits, and his morals.—Excite emulation, encourage industry, and recompense useful talent and enterprise by pecuniary and honorary rewards. With these teachings and these encouragements, the work of agricultural improvement will be accelerated; intellectual and moral improvement will receive a new impetus; science and art will consort as twin sisters, as legitimately designed; industry will become more honorable and be more honored; agriculture will assume a higher walk and character; and, to borrow Sully's simile, her paps shall teem with nutriment, that shall fill every mouth with plenty and every heart with joy. These things will lead to as benign a result here, as they have every where that they have been put in practice. They are as certain as cause and effect. "Does any one think," to quote a late writer, "that the world is travelled over, so that nothing remains to be explored? So far from it, the spirit of observation, when under the direction of science, labors with tenfold more success, and unfolds, even in the most beaten paths, a thousand resources of which man never dreamed. Look, for example, at the progress of horticulture. How many would have laughed at the idea of forming societies in reference to fruit trees, of which all the kinds were supposed to be familiarly known? And yet who does not know that science is creating new varieties, by following out the suggestions of nature? There can be no doubt that science will be continually drawing out new resources from the vegetable world. Fruits that are now thought worthless, will be multiplied, like the crab apple, into rich and various kinds; roots, like the potato and mandioca, which were poisonous in their natural state, will be disarmed of their venom, and *tamed* for the service of mankind." "The fact is, that every man, woman and child, has a direct interest in these studies. Every man who owns a beast; every woman who lives where moths corrupt a garment; every child who rambles in his holidays, returns burning with poison from the hedge, has a direct and pressing interest in studies of this description."

On the old continent, it has ever been the fortune of the tillers of the soil, though constituting the mass of population, to occupy a menial and subordinate station in society. Though their privileges have been nominal, their burdens have been onerous; they have been literally the tax paying class.—We profess to have thrown off the shackles from our yeomanry, and to hail them, particularly when we want their votes, as the enlightened sovereigns of the land; and sovereigns they truly are, and must continue to be, while our country remains free. But are they treated as such? Are they educated as such? We have established and endowed schools for the special instruction of the minor classes; but have we established any for the special benefit of the major class—the working class—the farmer and mechanic? We spend millions to protect our commerce; and we pay other millions in the form of custom-house duties—for it is the consumer who ultimately pays—upon the foreign commodities we consume, to encourage and sustain our manufacturing establishments. This is as it should be. But what direct aid do we give to our agriculture—the business that freights our commerce, and feeds our manufacturers? We have

no discriminating duty which protects this branch of our labor, nor do we ask for any. But we do ask for a more equal participation in the blessings of public education, and for legislative patronage, to enable us to develope the natural resources of our soil.

There is another point, I think, in which justice is withheld from the agriculturist. I mean in the imposition of our taxes. The balance of our mercantile and professional, and I believe manufacturing capital, consists in personal estate. The law al ows so much of this to be exempt from assessment and tax as is equal to their debts, which are too often enough to cover their personal estate. The property of the farmer consists principally of his farm—his personal effects being comparatively trifling, or of that description which the law exempts; and though he owes to the extent of his whole farm, the assessor is not allowed to abate a cent of its value, in consequence, upon the tax roll. The inequality of this rule will appear by supposing two individuals to start in business with a credit each of $10,000; one buys a farm for this amount, and the other buys merchandise. Neither are in fact worth any thing, above their debts. By the existing law, the farmer would be compelled to pay a tax on $10,000, while the merchant would not be required to pay a cent's tax. Is this right? Is it equitable? Does this not savor somewhat of the spirit of the aristocratic notions of the old world, which imposes onerous burthens upon the farmer? The impression is irresistible upon my mind, that although we have done much to elevate the farmer to his true rank in society, we have not done enough to improve the powers of his intellect—to make him wise in his business, and useful to the republic.

I come now to the question, what can this Convention do in furtherance of these great objects? To this I reply—imitate the industry, liberality, and perseverance of the good men who have achieved equally difficult tasks, in other branches of public improvement, in our day and country. Inform the public mind, digest your plans, and enlist the co-operation of your fellow-citizens. Petition your Legislature for the aid which justice and sound policy demand; and if they deny or neglect your prayers, carry your appeal to their fears: *threaten*, that, with respectful but persevering importunity, *you will continue to urge your claims* till more auspicious times, or a more enlightened policy shall crown your efforts with success. Imitate the persevering examples of Ami Dardin and Corn's Higgins, who renewed their applications for legislative justice, or legislative bounty, for more than twenty years, and until they finally gained a hearing, and got their reward.—There is no dishonor in being discomfited in a good cause, even twice or thrice, and there is much pleasure in finally triumphing.

On motion of Mr. Viele of Rensselaer, a committee of one from each Senate district was appointed to nominate officers for this Convention, and to report names at the next meeting. The committee appointed in accordance with the above motion, was Messrs. A. Van Bergen, H. Holmes, P. Jones, Gen. Hathaway, T. D. Burrall, J. McCollum, Charles Livingston, and P. Pelton.

On motion of Mr. Leland, of Steuben, a committee of two from each Senate district was appointed to report the proper business to be brought before this Convention, and the order of business that ought to be adopted therein.

The committee chosen in pursuance of the above resolution, were H. H. Jones and J. L. Graham, of the 1st district; J. Chambers and W. Cunningham, 2d district; A. M'Intyre and Joab Center, 3d district; L. Bradish and G. Wendell, 4th district; J. B. Yates and J. B. Lewis, 5th district; J. R. Drake and Z. A. Leland, 6th district; J. Hopkins and J. C. Fuller, 7th district; C. H. Carroll and L. F. Allen, 8th district; together with the chairman.

The Convention adjourned to meet at this place to-morrow at 3 o'clock, P. M.

Tuesday, February 9.

The Convention met at 3 o'clock, P. M. Mr. Van Bergen, from the committee to nominate officers for this Convention, reported the following names:

J. Buel, of Albany, President. G. Wendell, of Washington, 1st Vice-President; J. M'Call, of Allegany, 2d do.; L. Bradish, of Franklin, 3d do.; P. Patterson, of Genesee, 4th do. D. L. Dickinson, of Broome, and J. J. Viele, of Rensselaer, Secretaries.

The report was unanimously adopted.

Mr. Carroll of Livingston, from the committee appointed to report the business to be brought before this convention, reported as follows:

The committee of sixteen, who were appointed to consider and report suitable subjects for the action of the N. Y. State Agricultural Convention, have entered upon the consideration of the duties assigned them, with a thorough conviction, that the deliberations of this convention were intimately connected with the interests and happiness of the largest portion of their fellow-citizens throughout the State.

To advance these interests—to add new stimulus to industry, care, skill and economy, in increasing the productiveness of our rich soils, and in adding fertility to the poorer; to improve the condition and increase the profits of farm stock of every description; to make the various implements of husbandry more perfect, economical and useful; and generally to adapt the improvements and discoveries in science to agricultural pursuits, have occupied the anxious attention of your Committee, and they regret that their time will not allow them to detail and explain the various reasons and motives which have influenced them in presenting and recommending the following resolutions for the adoption of the Convention:—

Resolved, That it is expedient to provide by law, for the establishment of a school of scientific and practica lagriculture, and that this Convention respectfully solicit the Legislature of this State to incorporate a company for the above objects, and to endow the said school with such sum, and in such manner, as shall be commensurate with the great benefits to be attained thereby.

Resolved, That an appropriation of public moneys, to excite industry and emulation in agriculture, to reward those who make important discoveries in labor-saving machines, or in other departments of husbandry; or who improve or extend useful methods of cultivation, would tend greatly to increase the resources and revenue of the State, and to promote the diffusion of useful knowledge.

Resolved, That the extensive and increasing ravages of the wheat worm, present a strong claim upon an enlightened Legislature, alive to all the interests of her people, to offer a competent premium for the discovery of a perfect preventive or remedy for the ravages of the said worm.

Resolved, That it be recommended to the friends of agricultural improvement, in every county in this State, to co-operate with this Convention in obtaining legislative aid in furtherance of the objects of the above resolutions, and also in the speedy formation of an agricultural society in every county where there is not one already.

Resolved, That the existing laws in relation to common roads and bridges, are found, by experience, to be very defective and oppressive, inasmuch as the heavy tax which is annually imposed for these objects, is expended so lavishly, injudiciously and temporarily, as to produce no corresponding benefits to the tax-payers or to the community; and in the opinion of this Convention, the whole system requires alteration and amendment.

Resolved, That the agricultural publications, entitled the "Cultivator," published in Albany; the "Genesee Farmer," published in Rochester, and the "New-York Farmer," published in New-York, are eminently calculated to diffuse agricultural knowledge, to make known the various improvements in husbandry, and to excite and call forth new and valuable discoveries, and that they are therefore recommended to general attention and patronage, and particularly to that of the farmers.

Resolved, That, as property of every description is continually changing hands in a republican government like ours, and real property not more productive or valuable than personal, in the opinion of this Convention, all property, real and personal, should be subject to the same general rule of taxation—assessed and taxed equally wherever the same may be, and in whatever hands it may be found, without regard to ownership or indebtedness.

The above resolutions having been severally read, were unanimously adopted by the Convention.

On motion of Mr. Van Bergen, of Greene,

Resolved, That the paper entitled the "Silk-Worm," published in this city, be added to the list of those recommended to the patronage of the community.

Mr. Allen, from the Committee of sixteen, reported a memorial to the Legislature, which, being read, was adopted, and ordered to be signed by the officers of the Convention.

Tuesday evening, 7 o'clock.

The Convention met pursuant to adjournment. On motion of Mr. Shepard, of Cayuga, it was

Resolved, That the thanks of this Convention are due to the Hon. J. A. Dix, Secretary of State, for his very able and luminous report in relation to the geological survey of the State, made to the Legislature January 6, 1836, in pursuance of a resolution of the Assembly, April 6, 1835, and they express the hope that the Legislature will make the appropriation for the purposes recommended in said report.

On motion of Mr. M'Collum, of Niagara, it was

Resolved, That such provision be made, as the Legislature shall deem expedient, to encourage the growth and manufacture of silk.

On motion of Mr. Allen, of Erie,

Resolved, That this Convention recommend the introduction of elementary works on agriculture and horticulture, as reading books in our common schools.

On motion of Mr. Nash, of Monroe,

Resolved, That a state agricultural convention be held at the Capitol, in the city of Albany, on the first Thursday of February next, at four o'clock P. M., at which all persons are invited to attend, who take an interest in agricultural pursuits.

On motion of Mr. Frey, of Montgomery,

Resolved, That a copy of the opening address of Judge Buel to the Convention, be requested for publication; and that Mr. Carroll, of Livingston, and Mr. Allen, of Erie, be requested to furnish a copy of their remarks for the press.

On motion of Mr. Hopkins, of Cayuga,

Resolved, That the thanks of this Convention be tendered to the House of Assembly, for the use of their chamber during its sitting.

On motion of Mr. Fuller, of Onondaga,

Resolved, That the thanks of this Convention be given to the President, for the able and dignified manner with which he has discharged the duties of the Chair.

On motion of Mr. Leland, of Steuben, the Convention adjourned.

J. Buel, President.

J. M'Call, L. Bradish, G. Wendell, P. Patterson, } Vice Presidents.

D. L. Dickinson, J. J. Viele, } Secretaries.

MEMORIAL TO THE LEGISLATURE.

The following is the memorial alluded to in the above proceedings:

To the Legislature of the State of New-York:

The memorial of the subscribers, inhabitants of the State of New-York, assembled in Agricultural Convention, at the Capitol, in Albany, on the 9th February, 1836—respectfully represents:

That your memorialits consider that an acquaintance with the principles of the physical or natural science, embracing the properties of soils and manures—a knowledge of the structure and functions of animals—of the diseases to which they are incident, and the modes of cure;—of the principles of mechanics, in their application to implements of farm labor;—of the agency of heat, air, water and light in the growth of farm crops—and of new plants, their mode of culture, and use in the arts of commerce—as highly essential, in the cultivators of the soil, to the successful prosecution of husbandry, in this age of general improvement. That agriculture is the great business of our State, and the main source of its prosperity—and that no means present to their minds, so likely to insure substantial improvement in this primary branch of labor, as the establishment of a school of scientific and practical agriculture, which shall embrace the best models of practice in all the departments of rural labor: That three committees of the Legislature have reported in favor of the establishment of an agricultural school, with accompanying bills providing therefor, two contemplating the establishment to be made under the auspices, and at the expense of the State, and the other granting corporate powers to an association who had prayed to be incorporated for this purpose; that the latter bill passed the House of Assembly with three dissenting votes; but that this, as well as the other bills, were not finally acted upon, by reason of the late period in the session in which they were introduced, and the press of public business:—your memorialists pray for an act of incorporation, with a restriction therein, limiting the dividends to be derived from such institution to five per cent. per annum, for the above objects, and to endow such institution with such sum, and in such manner, as shall be commensurate with the great benefits to be attained thereby.

Your memorialists further represent, that they are persuaded great benefits to agriculture, and to the substantial interests of the community at large, have resulted from the law of 1819, "to improve the agriculture of this State," by the stimulus which it gave to industry, and the improvements which it induced in the various branches of husbandry; and believing that a further appropriation would be alike beneficial, in developing the capacities of the human mind, and of the soil, for improvement, and in augmenting the resources and revenues of the State,—they respectfully solicit that an appropriation be made, with the view of exciting laudable emulation, and of rewarding those who make important discoveries in labor-saving machines, or in other departments of husbandry—who introduce new and valuable breeds of animals, plants or seeds—or who improve or extend useful methods of cultivation, and that they believe such appropriation would tend greatly to increase the resources and revenues of the State, and to promote the diffusion of useful knowledge.

And your memorialists further represent, that within the last year, an insect, denominated the grain worm, before unknown among us, has committed serious depredations upon the wheat crop, in the northeast counties of this State; that it is progressing south and west, and threatens immense damage to this great staple product of our State, unless efficient means can be discovered to prevent its ravages. Your memorialists would respectfully suggest, that the Legislature offer a pecuniary reward, of sufficient amount to call into action the scientific and practical talents of our citizens, for the discovery of a preventive of the evil—the reward to be withheld until the efficiency of the preventive shall be fully and satisfactorily established.

J. Buel, President.

J. M'Call, L. Bradish, G. Wendell, P. Patterson, } Vice Presidents.

D. S. Dickinson, J. J. Viele, } Secretaries.

From the Farmers' Register.

ON THE USE OF LIME AS MANURE.

By M. Puvis.

Translated for the Farmers' Register from the Annales de l'Agriculture Francaise, of 1835.

Various qualities of Lime.

22. It is necessary for the farmer to know the nature of the lime which he uses. It may be pure, or mixed with silex, argil, or magnesia. *Pure lime* is the most economical, the most active, that which can produce the most effect in the least quantity.

Silicious limestone is used in greater quantity. The lime from it receives, as does the foregoing, the name of *hot lime*, and there is little difference in the application, except that more of the latter is wanting.

The *argillaceous lime* is the same as the hydraulic lime, or the *poor lime* of builders. It appears that the first two kinds are more favorable to forming grain, while the latter favors more the growth of straw, grasses, and leguminous crops. It is better for the improvement of the soil, but a heavier dose of it is required.

Magnesian lime acts very powerfully, but exhausts the soil if given in a large dose, or if it is not followed by alimentary manure in abundance. It has exhausted some districts in England, and entire provinces of America,* and it is to this kind that seem due most of the complaints made against lime.

By chemical processes the farmer may make himself sure of the nature of the lime which he uses.

Pure lime is commonly white, and is dissolved without any thing being left, in nitric or muriatic acid.

Silicious lime is often gray, and leaves a sandy residue, [after solution,] which is rough to the touch.

Argillaceous lime is obtained from stones which have a clayey odor and appearance: it is commonly yellow—and leaves, after the solution, a residue which is mostly an impalpable powder [*et qui prend en masse,*] which may be formed into a mass when wet.

Magnesian lime is made from stone commonly colored brown or pale yellow; it forms a white cloud in nitric acid, diluted with water, and used in less quantity than enough for saturation.

Of second Limings.

23. When the limed field returns to the state in which it was before the operation, when the same weeds re-appear, and the crops lower in product, it is time to renew

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* The author has been deceived by exaggerated accounts of injury from liming in America. It is probable that wherever it occurred, it was caused by the usual ignorance of the action of lime: from erroneously considering it as alimentary, and directly fertilizing manure, and after applying it, wearing out the soil by continued grain crops. Such effects are spoken of by Bordley.—[Ed. Far. Reg.]

the application of lime. It may be conceived that the time of the second liming depends on the amount given in the first. When the dressing has been light, it is necessary, as is done by the Flemings and the Manceaux, to recommence entirely, or to the extent of the first dressing: when it has been heavy, the next may be diminished by one-half. Besides, in this matter we should take counsel of the state of the soil, and of experience, because there are some lands which demand, and can use heavier doses of lime than others.

Quantities applied.

24. The quantities of first as of second dressings of lime, vary with the consistence of soils: they ought to be small on light and sandy soils—and may, without ill consequences, be heavy on clay soils.

The dose ought to vary according as the soil is more or less pervious to water, or as drained well or ill by its texture. Small applications to soils from which the superfluous water does not pass easily, are but little felt; but if the dressing is heavy, and the ploughing deep, the lime aids the draining, and adds to the healthy state of the soil. It may be conceived that the quantity of lime ought also to be increased with the annual quantity of rain that falls—because in proportion to that quantity ought the openness of the soil, and its fitness for draining, to be extended.

Nevertheless, the practices of the departments of the North, and of La Sarthe, seem to indicate the average dressing which suits in general for land: thus the liming of the North, which every ten or twelve years gives to the soil 46 hectolitres of lime to the hectare, or a little more than three hectolitres a year, agrees with that of La Sarthe, which gives eight or ten hectolitres every three years. The first plan gives at one dressing what the other distributes in four: as both make a like average, it may be thence inferred that the earth demands annually three hectolitres of lime to the hectare, [3 2-3 bushels to the acre,] to sustain its fecundity. But as neither the soil nor the plants consume all this quantity of lime, it is to be believed, that at the end of a greater or less length of time, the soil will have received enough to have no more need of it for a certain space of time.

Manner of treating Limed Lands.

25. After having, by liming, given the soil a great productive power, having put it in condition to produce the most valuable crops, which are often also the most exhausting, it is necessary to husband these resources—to give manure in return for the products obtained—to employ as litter, and not as food, the straw, now increased by one-half—to raise grass crops from the soil now fitted to bear them with advantage—in short, to modify the general plan, and the detail of the culture according to the new powers of the soil, the prices of commodities, and to local conveniences.

However, it is not necessary to hurry the change of the rotation. Such an operation is long, difficult, very expensive, and ought not to be executed but with much deliberation.

Effects of Lime on the Soil.

26. The effects of lime, although similar to, are not identical with those produced by marl; and the qualities of soils limed, differ in some points from those of natural calcareous soils. The grain from limed land is rounder, firmer, gives less bran, and more flour, than that from marled land: the grain of marled land is more gray, gives more bran, and resembles that made upon clover, though it may be preferable to the latter. The grain of a limed soil is more like that from land improved with drawn ashes. Limed land is less exposed to danger from drought than marled land, on soils naturally calcareous. The crop is not subject to be lodged at flowering time, when the sowing was done in dry earth.

27. In limed earth, weeds and insects disappear. The earth, if too light, acquires stiffness, and is lightened if too clayey. The surface of the argilo-silicious soil, before close and whitish, is made friable, and becomes reddish, as if rotten: it hardens and splits with drought, and is dissolved by the rains which succeed. This spontaneous loosening of the soil facilitates greatly the labor of the cultivator, the movement of the roots of the growing plants, and the reciprocal action of the atmosphere upon the soil, which remains open to its influence.

All these new properties which the limed soil has acquired, doubtless explain in part the fertilizing means which calcareous agents bring to the soil: but we think it is still necessary to seek some of these causes elsewhere.

28. Lime, according to the recent discoveries of German chemists, seizes in the soil the soluble humus or humic acid, takes it from all other bases, and forms a compound but slightly soluble, which appears, under this form, eminently suitable to the wants of plants. But as this compound is not soluble in less than 2000 times its weight of water, while without the lime the humus is soluble in a volume of water, less by one-half, it would follow that, in consequence of lime, the consumption of this substance, and the productive power of the soil would, in like proportion, be better preserved. Since the products of the soil increase much from the liming, while the humus is economised, since these products borrow very little from the soil, which remains more fertile while thus yielding greater products, it follows that the principal action of the lime consists, at first, in augmenting, in the soil, and in the plants, the means of drawing from the atmosphere the vegetable principles which they find there, and next, in aiding, according to the need, the formation, in the soil or the plants, the substances which enter into the composition of plants, and which are not met with ready formed either in the atmosphere or in the soil.

The researches upon these various points are curious, important, interesting to practice as well as to science—and will lead us to explain, by means not yet appreciated, the action of lime upon vegetation.

Absorption by plants of the principles of the atmosphere, in the vegetation on uncultivated soils.

29. Saussure has concluded, from his experiments, that plants derive from the soil about one-twentieth of their substance; and the experiments of Van Helmont and of Boyle have proved that considerable vegetable products diminish very little the mass of the soil. But this fact is still better proved by the observation of what passes in uncultivated soils.

Woodland that is cut over in regular succession [*taillis*] produces almost indefinitely, without being exhausted, and even becoming richer, the mass of vegetable products which man gathers and removes, and of which the soil does not contain the principles. If, instead of woodland thus partially and successively cut over, we consider upon the same soil a succession of forests, and, for greater ease of estimation, resinous forests, we find for the products of the generation of an age, forty to fifty thousand cubic feet to the hectare. This product is less than that of the resinous forests of many parts of the country, and yet it is nearly equal in bulk to half of the layer of the productive soil itself: it represents an annual increase of 24,000 weight of wood to the hectare—and which is produced not only without impoverishing, but even while enriching the soil, by an enormous quantity of the droppings and remains of all kinds.

These products which do not come from the soil, are then drawn from the atmosphere, in which plants gather them by means of particular organs designed for that use. These organs are the myriads of leaves which large vegetables bear—aerial roots, which gather these principles either ready formed in the air, or which take up there the elements, to combine them by means of vegetable power. But these aerial roots exert quite a different and superior energy in gathering the constituent principles of plants in the atmosphere, to that of the roots in the ground—since the former furnish nearly the whole amount of the vegetable mass, while the latter draw but very little from the soil.

30. Plants may well find in the atmosphere the greater part of the *volatile* principles which compose them—the carbon, hydrogen, oxygen, and azote. But it is not so easily seen whence they obtain the *fixed* principles of which their ashes are composed. These products could not exist ready formed in the soil—for the saline principles contained in the ashes of a generation of great trees, which would amount to more than 25,000 weight to the hectare, would have rendered the soil absolutely barren, since, according to the experiments of M. Lecoq of Clermont, the twentieth part of this quantity is enough to make a soil sterile. We would find a similar result in accumulating the successive products of an acre of good meadow. It is then completely proved that the saline principles of plants do not exist ready formed in the soil. They are no more formed in the atmosphere, or the analyses of chemists would have found them there. However, as the intimate composition of these substances is not yet perfectly known, their elements may exist in the atmosphere, or even in the soil, among the substances which compose them.

Neither can it be said that these salts may be derived from the atomic dust which floats in the air; for this dust is composed of fragments organic and inorganic, carried especially to the plants themselves, and then, in estimating this atomic matter at the most, we will scarcely find in it the hundredth part of the saline substances contained in the vegetable mass produced. We ought then to conclude that the saline substances of plants are formed by the powers of vegetation, or of the soil.

31. In like manner as with the saline principles, the lime and the phosphates of ashes ought to be due to the same forces, whether that the roots take up their unperceived elements in the soil, or that the leaves gather them in the atmosphere. This consequence results evidently from this fact—that plants grown in soils, of which the analysis shows neither lime nor phosphate, contain them notwithstanding in large proportion in their fixed principles—of which [or of the ashes] they often compose half the mass.*

* This fact is explained very differently by the Essay on Calcareous Manures (Ch. VII.) where it is used to sustain the doctrine of neutral soils.—[ED.]

Absorption of plants, in vegetation on cultivated soils.

32. Vegetation on uncultivated soils operates under conditions altogether different from those of the cultivated, so that the results receive modifications which it is important to examine.

Nature produces, and continues to produce, all the vegetable mass in spontaneous growth, without any other condition than the alternation and succession of the species. In vegetation on cultivated land, by bringing together the same individual plants which are to grow abundantly on a soil and in a climate which, in most cases, are not those which nature had designed, there are required besides the general condition of alternation of the species, frequent tillage of the soil, and means to repair its losses, that the culture may be productive, and be continued. However, with these new conditions, the force of absorption of plants on the atmosphere still furnishes the greater part of the vegetable principles in soils not limed—and still more in limed soils.

To form a precise idea, we will take it in the land of the writer, its culture and its biennial rotation. As the same qualities of soil are found elsewhere, as no particular circumstance increases or impairs its products, there would be found similar results, for the same qualities of soil, with a different culture. The inferences which we will draw from ours, will apply then to all others.

On our soil of the third class, [or worst quality] fallow returns every two years, with a biennial manuring of 120 quintals to the hectare. This mass contains more than four-fifths of water, which should not be counted as manure, and consequently the substance which serves for the reparation of the soil is reduced to 24 quintals. We reap, in rye, straw, and buckwheat, after the year of fallow, a dry weight of 40 to 50 quintals on an average. If it is supposed that all the manure is consumed, or employed in forming vegetable substance, still the soil would have furnished 18 to 20 quintals more than it received, and which excess would be due to the power of absorption, whether of the soil, or of the plants, on the atmosphere.

On land of middle quality, which yield a crop every year, with a double manuring, that is to say, of 48 quintals of dry manure, in two years, there is a product in wheat, maize, or potatoes, which amounts to from 12 to 15,000 weight, 120 to 150 quintals, of which two-thirds, or 80 quintals at least are derived from absorption.

On soils of good quality, with a manuring of one-third more than the last, which is equal to 64 quintals of the dry substance to the hectare, there are obtained of dry products, in grain, straw, roots, or hay, double of the last, or nearly so, of which three-fourths, or 180 quintals are due to the power of absorption.

Lastly—upon the most fertile soils, (*sols d'exception,*) where manures are useless, the product, often double, or at least half as much more than the last mentioned, will amount to 360 quintals to the hectare in two years. This product would be, as in spontaneous vegetation, entirely due to absorption.

We would have then, to represent the products of two years, in quintals, in the four classes of soil under consideration, the progressive amounts of 42, 130, 240, 360; or, by deducting from these products the weight of the manure, we would have, to represent the power of absorption, the progression 18, 82, 176, 360 quintals. From this is deduced, as the first conclusion, that, supposing the plants have consumed and annihilated all the substance of the manure given, (which is beyond the truth,) plants receive a much greater part of their substance from the atmosphere, than from the soil; and that this power of drawing food from the atmosphere increases with the goodness of quality in soils.

33. The proportion of fixed substances, or ashes, in agricultural products, is 43 lbs. to the 1000, and consequently, in our four classes of land, the quantity amounts to 180, 559, 1032, 1548 pounds. But the soluble saline substances form at least half of these ashes: they are then produced in the two years of the rotation, in the quantities of 90, 279, 516, 774 pounds. But, according to Kirwan, barn yard manure yields 2 per cent. of soluble salts; then the manure given to these soils contained 48, 96 lbs. 128 of saline substances, which being deducted from the preceding quantities, leave the four classes of soils stated 42, 183, 388, 774 lbs. of products in soluble salts, in two years of the rotation, gained solely by the absorbing forces of the soil and of plants.*

34. But, in the same soils, with the same manures and the same tillage, by the addition to the thickness of the ploughed layer of only one-thousandth part of lime, the products, whether volatile or fixed, are increased in a striking manner: the soil of the first named (or lowest) quality reaches the product of the second—the second rises one-half or more—and that of the best (of the manured soils) increases a fourth. Thus, our scale of product becomes 130,200,300 quintals—and deducting the manure, 106,152,236 quintals, for the two years of the rotation. The most fertile soil (*sol d'exception*) cannot receive lime beneficially because it contains it already; these lands all belong to alluvions, where the calcareous principle has almost always been found in greater or less proportion.

35. The product of fixed principles [as ashes] in the three classes of limed soils, would be 559,868,1290 pounds, and in soluble salts, 278,430,645 pounds; and deducting the soluble salts of the manure, the quantities would be 230,334,525. A light addition of lime has then doubled the force of absorption, and almost tripled the quantity of saline principles produced. One of the most remarkable effects of lime consists then, in making a soil produce a much greater proportion of saline principles: and if the experiments of M. Lecoq upon the efficacy of saline substances on vegetation are to be admitted, it would be in part to the phenomenon of their production that lime would owe its fertilizing effect.

36. It results from what precedes, that salts are formed in the soil, or in vegetables: thus we see every day the nitrates of potash and of lime form under our eyes in the soil, or elsewhere, without any thing indicating to us the origin of the potash which is contained. But potash itself again forms spontaneously in drawn ashes, according to the observations of the chemist Gelhen We see salts also renewed in the artificial nitre beds, with the aid of moisture and exposure to the air. But it is the presence of lime that determines this formation more particularly. The nitrates abound in the ruins of demolished edifices; they are formed in the walls and in all parts of houses situated in damp places; they effloresce on the buildings of chalk in Champagne; they are produced spontaneously in the ploughed lands of the kingdom of Murcia. This effect, which we see that the calcareous principle produces every where, we think it produces in all the soils to which it is given, and where meet the circumstances which favor the formation of nitrates, viz: humidity, vegetable mould, and exposure to the air. But, according to the experiments of M. Lecoq, and others, and the opinion which is established of the old agriculturists, the nitrates are the most fertilizing salts. It would be then to their formation, which it promotes in the soil, that lime owes, in part, its effect on vegetation.

37. The foregoing proofs of the daily formation in the soil, and by vegetable life, of saline and earthy compounds, taken in nature and on a great scale, are doubtless sufficient: but they may still be supported by the experiments and opinions of able men who have adopted the same system.

And first—in the experiment of Van Helmont, in five years, a willow of five pounds grew to weigh 169, and had caused a loss of only two ounces to the soil which bore it. But the 164 pounds which the willow had taken contained five pounds of ashes, which are due entirely to absorption, since the leaves and the other droppings of five years, which were not saved, would have given at least one pound of ashes, which makes up for, besides, all that which, in spite of the sheet of lead which covered the top of the vessel in which the willow grew, it might have received in the waterings, and from other fortuitous circumstances. Boyle has repeated and confirmed this experiment in all its parts.

		Constituents of 100 parts of ashes.					
Names of Plants.	Ashes from 1000 parts dry.	Soluble Salts.	Earthy Phosphates.	Earthy Carbonates.	Silicia.	Metallic Oxides.	Loss.
Wheat, in flower,	—	43,25	12,75	0,25	32	0,5	12,25
Do seeds ripe,	—	11	15	0,25	54	1	18,75
Do. seeds ripe,	33	10	11,75	0,25	51	0,75	23
Straw of wheat,	43	22,5	6,2	1	61,5	1	78
Seeds of do.	13	47,16	44,5	—	0,5	0,25	7,6
Bran,	52	4,16	46,5	—	0,5	0,25	8,6
Plants of maize, (Indian corn,) a month before flowering,	122	69	5,75	0,25	7,5	0,25	17,25
Do. in flower,	81	69	6	0,25	7,5	0,25	17
Do. seeds ripe,	46						
Stalks of do.	84	72,45	5	1	18	0,5	3,05
Spikes, (tassels,) of do.	16						
Seeds of do	10	62	36	—	1	0,12	0,88
Oats(entire plant),	31	1	24	—	60	0,25	14,75

The proportion of soluble salts, 2 per cent found by Kirwan in barn-yard manure, however correctly ascertained in a particular case, can no more be relied on as a fixed and uniform proportion, or even a true general average, as used by M. Puvis in the estimates above.—[Ed. Farm. Reg.]

Lampadius, in different isolated compartments, some filled with alumine, others with silex, others with [carbonate of] lime, all pure, has made to grow plants, of which, the burning has yielded to analysis like results, and which, consequently, contained

* The proportions of ashes of different plants, and of their saline matters, vary greatly—and the uniform proportions assumed above, are far from correct, even as averages of unequal proportions. This will sufficiently appear from the following examples extracted from Saussure's table of the products of various vegetable substances. (See Davy's Ag. Chem. Lec. III.)

earths which were not in the soils which bore them.

Saussure, in establishing that plants do not take in the soil more than a twentieth of their substance, in extract of mould and in carbonic acid, has necessarily established, by the same means, that almost the whole amount of fixed principles do not proceed from the soil.

Braconnot has analyzed lichens, which contained more than half their weight of oxalate of lime—and he has observed others covered with crusts of carbonate of lime, when there was none of this earth in the neighborhood.

Shrader, in burning plants grown in substances which did not contain any earthy principle, has found in their ashes, earths and salts which were neither in the seeds sown, nor in the pulverized matters in which the plants grew.

Lastly—the analyses of Saussure, though showing more of the carbonate of lime in the ashes of plants which grew on calcareous soils, than on soils not calcareous, yet nevertheless, they have formed more than a sixth of the ashes from vegetables on silicious soils—and Einhoff has found 65 per cent. of lime in the ashes of pines grown on silicious soil.* The labors of science then confirm what we have above established, that plants, or the soil, form salts and earths.†

38. The fertilizing effect of fallow, or ploughing, of moving and working the soils prove still more that all these circumstances determine the formation of fertilizing principles, and probably of saline principles, in all the parts of the soil which receive the atmospheric influences.

But salts are also formed in plants. The nitrate of potash, which takes the place of sugar in the beet—the oxalate of potash, so abundant in sorrel—the carbonate of potash in fern, in the tops of potatoes, and in almost all vegetables in the first period of their life—the sulphate of potash in tobacco—the nitrate of potash in turnsole and in pellitory—prove, without reply, that vegetation forms salts, as it forms the proper juices of plants, since the soil contains the one kind no more than the other. But can we say where plants take the elements necessary for all these formations? They can take them only in the soil by means of their roots, or in the atmosphere—in the soil, which would itself take them in the atmosphere, in proportion to the consumption of plants—or directly in the atmosphere by means of their leaves which would there gather these elements. And if the analyses of the soils, and of the atmosphere, show almost none of these elements, it will be necessary to conclude from it, that the substances which analysis has found there, are themselves, or would furnish, if decomposed, the elements of the saline substances, although science may not yet have taught us the means of reaching that end.

39. The formation of lime, like that of the saline principles necessary to plants, is an operation which employs all the forces of vegetation—and these forces, directed to this formation, have no energy left to give a great development to plants: but when the vegetable finds the calcareous principles already formed in the soil, it makes use of them, and preserves all its forces to increase its own vigor and size.

It would then result, from all that has been said, that lime modifies the texture of the soil—makes it more friable—invigorates it—renders it more permeable—gives it the power to better resist moisture as well as dryness—that it produces in the soil the humate of lime which encloses a powerful means of fertility—that lime increases much the energy of the soil and of plants to draw from the atmosphere the volatile substances of which plants are composed, oxygen, hydrogen, carbon and azote—that the limed soil in furnishing to plants the lime which they need, relieves the soil and plants from employing their powers to produce it—and finally, that lime promotes the formation of fixed substances, earthy or saline, necessary to vegetables. All this whole of reciprocal action and reaction of lime, on the soil, plants and atmosphere, explains in a plausible manner, its fertilizing properties. We would, consequently, have nearly arrived at the resolving of an important agricultural problem, upon which were accumulated all these doubts.

The amount of lime taken up by vegetation.

40. The ashes of plants from calcareous soils, or those which have been made so by manures, contain 30 per cent. of the carbonate and phosphate of lime, which, by taking off the crop is lost to the soil. But the product of limed land of middle quality, is during the two years of the course of crops, about 20,000 lbs. of dry products to the hectare, which contain a little less than a hectolitre of lime in the calcareous compounds of the ashes. The vegetation has then used half a hectolitre a year. But we have shown that there was necessary, on an average, three hectolitres per hectare, each year. Vegetation then does not take up, in nature, but a sixth of the lime which is given profitably to the soil; the other five-sixths are lost, are carried away by the water, descend to the lower beds of earth, are combined, or serve to form other compounds, perhaps even the saline compounds, of which we have seen that lime so powerfully favors the formation. Another portion, also, without doubt, remains in the soil, and serves to form this reserve, which in the end dispenses, for many years, with the repetition of liming.

Of the exhaustion of the soil by liming.

41. "Lime," it is said, "only enriches the old men: or it enriches fathers and ruins sons." This is indeed what experience proves, when, on light soils, limed heavily, or without composts coming between, successive grain crops have been made without rest, without alternations of grass crops, or without giving to the soil alimentary manures in suitable proportion. It is also what has happened when magnesia, mixed with lime, has carried to the soil its exhausting stimulus. But when lime has been used in moderation—when, without overburdening the land with exhausting crops, they have been alternated with green crops—and that manure has been given in proportion to the products taken off—the prudent cultivator then sees continue the new fecundity which the lime has brought, without the soil showing any sign of exhaustion. No where has there been complaint made of argillaceous soils being damaged by lime; and the productiveness of light soils is sustained, in every case that the lime was used in compost.

In America, where the lime of oyster shells has taken the place of that of magnesian limestone, the complaints of the exhausting effects of lime have ceased.

*Healthiness given to the soil and to the country by calcareous agents.**

42. The unhealthines of a country is not caused by the accumulation of water, nor from soil being covered by water. Places on the borders of water do not become sickly but when the water has quitted some part of the surface which it previously overflowed, and the summer's sun heats the uncovered soil, and causes the decomposition of the remains of all kinds of matter left by the water, and contained in the upper layers of the soil. Thus, ponds are not unhealthy but when drought, by lowering the waters, leaves naked extensive margins, to be acted on by the sun and air. In rainy years, fevers on the borders of ponds are rare.

Epidemic diseases most often arise on the borders of marshes laid dry—in the neighborhood of mud thrown out of ditches or pits—and in the course of bringing new land into cultivation, where the ploughed soil is for the first time exposed to the summer's sun. In the interior of Rome, the vineyards, the gardens are remarkably unhealthy—while the sickliness disappears where the emanations from the soil are prevented by buildings. In the Pontine marshes, they cover the dried parts with water to arrest the danger of their effluvia. It is then from the soil, and not from the waters at its surface, that insalubrious emanations proceed. Waters placed on the surface, always in motion, agitated by every wind, are not altered in quality, and do not become unhealthy: but whenever they are

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* It is presumed, from the context, that these silicious soils, were not the least calcareous.—[ED. F. R.]

† Van Helmont's experiment, cited first in the list above, like M. Puvis' reasoning in general, furnishes ample proof that most of the volatile parts of vegetables, and the greater part of their bulk, are drawn from the atmosphere—and they are equally defective in proving that earths and other fixed principles are thence derived, or are formed by the power of vegetable life. Distilled water is not entirely free from earthy matter, and if it had been used for watering the willow, it would in five years have given some considerable part of the five pounds of solid matter in the ashes. But as we are not told that it was either distilled or rain water, it may be inferred that the comparatively impure water of a fountain or stream, was used for watering the plant, and which would more than suffice in so long a time, to convey the whole increase of earthy and saline matter. The experiments of Lampadius and Shrader are liable to the same objection—and the former to this in addition—that his earths were deemed absolutely pure, when, in all probability, they were not so—and that a very slight admixture of other kinds with each, would furnish the minute quantity that a small plant could take up during its short and feeble existence under the circumstances stated. The results stated of the experiments of Braconnot, Saussure and Einhoff, may be, and probably are, entirely correct—but they are fully explained by the doctrine of neutral soils, and need no support from, and give none to our author's doctrine of the formation of lime by vegetable power.

But though deeming M. Puvis altogether wrong in this, his main and most labored position, and that the proofs cited above, as well as some others in the preceding section, are of no worth, still these pages which present his theory, contain what is of more value. He places in a strong point of view the important truth that the atmosphere is the great treasury of nature, from which nature doubles and triples the amount of all the small portions given to the earth by the industry of man. The author's scale of actual products from different grades of soil is also interesting. It sustains the position assumed in the Essay on Calcareous Manures, that the worst soils are liemd (or made calcareous) to most profit—and that alimentary manures, when needed, are most productive on the best soils.—[ED. FAR. REG.

* There was no position in the Essay on Calcareous Manures which its author assumed with so much hesitation as the agency of those manures in removing causes of disease. That hesitation did not arise from doubt of the truth of the position—but because of its very high importance, and its entire novelty—its being then sustained but by few known facts furnishing direct evidence, and by no known authority whatever of earlier writers. It is therefore the more gratifying to find in the work now presented, that about the same time, another and far remote investigator of the same subject, by a different course of reasoning, and by different proofs, had arrived at precisely the same conclusion—and that he maintains even more generally than the former work, the important and sure effects of calcareous manures in rendering a country more healthy.—[ED. FAR. REG.]

contained in some place without power to receive exterior influences, or to have motion, they are altered in their odor, taste, and consequently injured in relation to health.

Whenever water then, without covering the soil, penetrates the upper layer without being able to run through the subsoil, it remains without motion, and stagnant, within the soil—is changed by the summer's sun, serves to hasten the putrefaction of the broken down vegetable remains in or on the mould, and the exhalations from the ground become unhealthy. Thus are all drained marshes, of which the surface only is dry, while the water still penetrates the subsoil—thus, all the margins of rivers which have been covered by recent inundations of summer, are unhealthy: thus also, (for a great and unhappy example,) the argilo-silicious plateaux, whenever the closeness of the subsoil does not let the water pass through, produce, in dry years, at the close of summer, emanations which attack the health of the inhabitants.

43. But this unhappy effect appears almost no where in calcereous regions: the margins of lakes and ponds there situated do not produce the same unhealthiness, and even the marshy grounds there are less unhealthy.

The waters which spring out of, or run over calcareous beds, are always healthy to drink. The borers of Artesian wells are anxious that the water which they obtain, to be good, may come out of the calcareous strata which they go through. When the waters which hold carbonate of lime in solution in carbonic acid* run over the surface, they give health to the meadows, in changing the nature and quantity of the products.

Linnæus thought that the unhealthiness of most countries depended on the nature of the water, and was owing to the argillaceous particles which they contain; now these argillaceous particles are always precipitated by the calcareous compounds. For this reason, the waters which stand upon, or run over marl, or calcareous rock, are almost always limpid and clear, because the argillaceous particles have been precipitated by the effect of the solution in the water of the calcareous principle, which is itself dissolved by an excess of carbonic acid.

We are not far from believing then, that throwing rich marl, or limestone, into a well of muddy and brackish water, might have the effect, in part at least, of clearing it, and making it healthy to drink. This remedy, if it should not be as useful as we think, at least could not produce any injury.

Lime, in all its combinations, destroys the miasmata dangerous to life. Its chloride annihilates all bad odors, arrests putrefaction, and in short, has subjected the plague of Egypt to the skill and courage of Pariset. The white wash of lime upon infected buildings, upon the walls and mangers of stables, is regarded as serving to destroy the contagious miasmata of epidemic and epizootic diseases.

Lime destroys the plants of humid and marshy soils, and makes spring those suitable to better soils: then its effect is to give healthines or vigor to the soil, to dry it, and make it more mellow and permeable. The water then is no longer without motion, and altered consequently in its condition. The limed soil then, to the depth it is ploughed, ought to change the nature of its emanations, as well as its products: and if the lower strata or subsoil, send up emanations, these effluvia in passing through the improved layers of soil, where the calcareous agent is always at work, and developing all its affinities, ought also to be modified, and take the character of those of the upper bed. The limed soil then, it would seem, ought to be made healthy.

But what we maintain here by induction, by reasoning, is fortunately a fact of extensive experience. Among all the countries in which lime has carried and established fertility, there is not cited, that I know of, a single one where intermittent fevers prevail—while that they have not disappeared in the country even where an active culture draws good products from the impermeable argilo-silicious soil.

44. To extend the great benefit of healthiness to the whole of a country, it is no doubt necessary that the whole coutry should receive the health-giving agent. However, on every farm, in proportion as liming is extended over its surface, the chances of disease will be seen to diminish—and the healthiness of the country will keep pace with the progress of its fertility.

Result of the use of improving manures on the soil of France in general.

Three-fourths of the whole territory of France, to be rendered fruitful, have need of calcareous agents. If the third of this extent has already received them, (which we believe is above the truth,) upon the other two-thirds, or the half of the whole, the agricultural products, by this operation, would be increased by one-half or more, or one-fifth of the total amount. But agriculture, in enriching itself will increase its power, its capital, and its population, and will naturally carry its exuberant forces, its energy and activity to operate on the greater part of the 7,000,000 of hectares of land now [*en friche*] untilled, waste, and without product. By bringing these lands into cultivation and fertilizing them by liming or by paring and burning the surface, they would be made to yield, at least, one-sixth of the total product. The gross product of the French soil, then increased by a third or more, might give employment and sustenance to a population also one-third greater than France now possesses; and this revolution due successively to the tillage of the soil, to annual improvements keeping pace with the progressive increase of crops, would be insensible. The state would grow in force, in vigor, in wealth, in an active and moral population, which would be devoted to peace, and to the country, because it would belong to this new and meliorated soil. And this great result would be owing simply to applying calcareous manures to the extent of the soils of France which require them!

46. Upon our extent of 54,000,000 of hectares, our population increased to 44,000,000, would have for each, one hectare and a quarter, and would be less confined than the 24,000,000 of inhabitants of the English soil, who have only one hectare to the head; and yet our soil is at least as good, and it is more favored by climate. And then our neighbors consume in their food, at least a fourth or fifth of meat, while only one-fifteenth of the food of our population consists of meat; and as there is required twelve or fifteen times the space to produce meat as bread, it follows that twice the extent of soil is necessary to support an Englishman as a Frenchman. Hence it results, that with an increase of one-third, our population would still have a large surplus product which would not exist in England, with an equal increase of population and equal increase of products of agriculture.

But this prosperity of the country, (yet far distant, but towards which however, we will be advanced daily,) would be still much less than in the department of the North, where a hectare nearly supports two inhabitants. And yet they have more than a sixth of their soil in woods, marshes, or unproductive lands: they have besides, another sixth, and of their best ground, in crops of commerce, which consume a great part of their manure, and which are exported almost entirely. This prodigious result is, without doubt, owing in part to a greater extent of good soil than is found elsewhere; but it is principally owing there, as well as in England, to the regular use of calcareous manures. As we have seen, more than two-thirds of this country [the North] belongs to the class of soils not calcareous, to the argilo-silicious plateaux, and makes use of lime, marl, or ashes of all kinds.

47. After this great result of increased productiveness, that upon health, although applied to the least extents of surface, would be most precious. Upon one-sixth of our country the population is sickly, subject to intermittent and often fatal fevers, and the deaths exceed in number the births. Well! upon this soil without marshes, calcareous manures would bring a growing population, more numerous than that of our now healthy parts of the country—and as labor would offer itself from every side, these regions, made healthy, would soon be those where the people would be most happy, the richest, and the most rapidly increasing in numbers.

48. If we are not under an illusion, the calcareous principle and its properties upon the soil, form the great compensation accorded by the Supreme Author to man, in condemning him to till the earth. Three-fourths of our soil seem not to produce, except by force of pain and labor, the vegetables absolutely necessary for man. On all sides, and often beneath this surface so little favored, is found placed the substance necessary to the soil, to render it as fertile as the best ground, to enable the cultivator to use for his profit the vegetable mould which it contains and has been accumulating for ages—and to cause the entire soil to be covered by a population active, moral, and well employed. And this precious condiment, this active principle of vegetation, is only needed to be applied in small proportions, to obtain products of which the first harvest often compensates for all the labor and expense. And to complete the benefit, insalubrity, which afflicts the infertile soil, disappears; the new population finds there at the same time strength, riches, and health. There, without doubt, is one of the most happy harmonies of the creation, one of the greatest blessings with which the Supreme Author has endowed the laborious man who is devoted to the cultivation of the earth.

We had marked No. 1 of this series of letters on Sheep Husbandry, before the conflagration; but it was in *ashes* before we could put it in *type*, and therefore, we are compelled to commence with No. 2, which we regret, as we desire to give the series entire. They evince much valuable information upon the subject to which they relate,

* As in limestone water, lime with the greatest proportion with which it can combine of carbonic acid, (forming super-carbonate of lime,) is soluble in water. The excess of acid is lost by heat, by exposure to air, &c., and then the lime is in form of carbonate—and being insoluble in water, falls separate to the bottom. —[Ed. Far. Reg.]

and should be carefully read by every sheep grower.

From the Cultivator.

SHEEP HUSBANDRY.

No. II.

The common sheep of Spain have coarse light fleeces, being worth from 10 to 12 cents per pound, and reared principally for their flesh.

"The word *Merino* is Spanish, it signifies governor of a small province, and likewise him who has the care of the pasture and cattle in general. The *Merino Mayor* is always a person of rank, and appointed by the king; the duke of Infantado is the present *Merino Mayor*."

The *mayors* have a separate jurisdiction over the flocks in Estramadura, which is called the *mesta;* and there the king is the merino mayor. Each flock consists of 10,000 sheep with a mayor or head shepherd, who must be an active man, well versed in the nature of pasture, as well as in the diseases of his flock. It might be interesting to some to pursue this part of the subject further, but I fear encroaching on the limits of your paper; if it should excite an interest to consult standard authorities and investigation, my present object will be attained.

The word *merino* is now by general usage applied to the fine wooled Spanish sheep.

From the earliest history of Spain, the possession and cultivation of a peculiar breed of fine wooled sheep has been a subject of high national legislation, and although it was carried to an extent greatly oppressive and injurious to some other interests, yet it resulted in preserving and impreving their sheep above those of the whole civilized world.

The origin of the fine Spanish sheep, as stated in the preceding number, is yet left for ingenious investigation.

Strabo, speaking of the beautiful woolen clothes that were worn by the Romans, says that the wool was brought from *Truditania*, in Spain. After the conquest of Spain by the Romans, the elder Columella was one of the early emigrants to Spain. For "Spain was at that time highly civilized; and agriculture was the favorite pursuit of all who were not occupied in war." How desirable is it that our country should properly appreciate this great source of happiness, wealth and true greatness.

Mr. Tessier, a distinguished member of the French Institute, and who was commissioned to investigate this subject, says, "all that we know of the *merino* is, that they have a long time existed in Spain; the *merino* is a distinct breed of sheep; as in the class of dogs, the Danish dog, the grey hound, the shag dog, the lap dog, &c. And in the same manner as among dogs, the cross breeds may afford individuals more or less approximating to the species, but never the species itself." Another writer says, "the *merino* differs more essentially from every other kidd of sheep, than the spaniel does from the mastiff And yet no one has seen any change in either of those species of dogs in the course of generations, or in any climate, except by intermixture of the breeds. I say the *merino* differs essentially from all other sheep, and even from all other quadrupeds of which we have any knowledge, as an annual does from a perennial plant. All quadrupeds change their coats every year, and indeed generally twice a year; the *merino* sheep never changes his coat, on the contrary, it will continue to grow from year to year, and at the end of the third year, the fleece will yield a three years' crop, with little or no diminution. This has been tried in France, Switzerland, and England."

Sportsmen, for the purpose of the chase and the turf, well understand their business, in breeding the greyhounds and blood-horses. Will the deliberate scientific agriculturist be shamefully distanced in the comparison of his pursuit with that of play and recreation? Will he rear a cock that will not fight on his own dunghill? Excite an interest, raise a competition, and any subject at this day will be investigated. Let us observe the course which nature treads.

"God never made his works for man to mend."

I would, with Franklin, conduct the lightning harmless down, but not in folly strive to stay its force.

Mr. Livingston says, "It will be of use to be acquainted with the several breeds of Great Britain and Spain, as a direction to those who may endeavor to import sheep from thence; for though every *variety** of the *merino* is valuable, yet they differ widely from each other in beauty, in form and in fineness of fleece, as may be judged from the prices in Spain, where Leon and Escurial wool sells for 100 cents, while that of Arragon brings only 60 cents, with several intermediate kinds."

The principal flocks of Spain are divided into the (*Transhumanta*), or which migrate from north to south twice every year, and include the greatest number, their route having been regulated from time immemorial by legislation. The privilege of a route ninety paces wide across the cultivated fields, is claimed and maintained by the government for the passage of the public flocks.

Then the (*Estantes*), or stationary flocks.

These are next subdivided into several varieties and denominations, originating either in ownership or locality of production, of which the most prominent are the following, viz:

Those of the Escurial convent are altogether the finest and most perfect of any of the Spanish flocks, combining excellence scarcely admitting of improvement.

Those of the duke Infantado and of the countess Negritti are but imperfectly known in this country.

Those of the Monturio and Gaudaloupe, of those brought to this country, rank next to the Escurial in their most essential qualities.

Those of the Paulaur convent. Of all the Spanish flocks this is the largest sheep, elegant in form, and producing the greatest fleece, out at the same time, coarse, and abounding in jarr and yolk. He has a large dew-lap extending from the chin to the breast. This wool, though not answering the full requirement of the market, nor meeting the nicety of modern machinery; still, however, standing in advance of all crossing with Dishly, Lincolnshire, or other mongrel productions, and of all others are the most rugged and hardy, almost answering the requirement of a *sheepman*, who thinks sheep require no care.

I have seen some fleeces of Paulaur bucks highly fed, weighing, unwashed, twelve and fourteen pounds.

Besides these, there are many other flocks which I shall omit to describe.

The *emigrant merino* will form the subject of the next paper. F.

HORSE-POWER GRIST MILLS.—We have seen a specimen of *corn meal* ground in one of the horse-power *Grist Mills*, which is becoming so popular with the owners of large landed estates. The lower *bed-stone* instead of the upper one, runs, and instead of the stones, which are burrs, performing a circular revolution, they run horizontally. The grain resting on the *bed-stone* is thrown out by the centrifugal force as soon as ground, which leaves the meal *lively*, though very fine. The sample before us is truly a most beautiful one; to the eye it looks more like *wheat* than *corn meal*, and yet when submitted to the test of the finger and thumb, its delightful granular touch indicates at once that none of the vital principle, which is the life of all flour, and imparts to bread its most desirable quality, had been lost in the process of grinding.—These mills reduce three bushels of corn into meal in an hour, and they are equally effective in producing flour out of any other grain.

To gentlemen who have a large number of hands or stock, one of them would certainly be a most valuable acquisition, enabling them, as it would, not only to procure a supply of flour for the former without going off their respective estates, but of feeding the latter also with ground food, a thing of the first importance, both with respect to the health of animals and to the saving of provender. It is the opinion of some of the best judging farmers in Europe and America, that by grinding all grain fed to stock, and cutting and steaming their hay or fodder, at least one-third less will serve them, and that the animals themselves can be thus kept in better condition.

Is it not desirable to substitute power cheaper than *horse* or cattle power for these mills? It appears to us that it would, and we are of the opinion that such a power may be found on almost every farm in the country, if properly applied.

The power used in these mills is simply the weight or gravity of the animals when used upon a horizontal wheel, or their power of traction increased by the leverage, when otherwise. If, therefore, an equal gravitating force can be obtained with less original outlay than for a single horse—which will require neither provender nor rest to recruit its strength, and which will be *perpetual;* it seems to us that an important desideratum will be obtained. Such a substitute for animal power, we believe, may be found wherever *four* or *five* or *six* feet fall can be found on the thousand small streams of the country, by the use of a wheel invented by Mr. Foss, a description of which will be given in our next number.

Mr. Foss has invented another wheel, which is designed to be used in rapid currents, whether in rivers or of the *tide*. One of its advantages over ordinary tide wheels consists in the facility with which it may be used without the construction of a *pier* in the stream, to support one end of the shaft. The whole apparatus is supported on the shore, and the wheel may be raised or lowered to suit the rise and fall of the tide, or it will operate under water.

WILLIAM ATKINSON, Rochester, New-York, Real Estate Broker, buys and sells on commission, FARMS in the county of Monroe, and attends to the collection of Mortgages.

Persons desirous of purchasing Farms in that fertile region, will do well to call on him. *6t

From the New-England Farmer.

INTEREST OF MONEY—PERNICIOUS LAWS—FARMING.—Of all the numerous laws of our Commonwealth, there are none which affect more injuriously the prosperity of the people of the country at large, than the laws which limit the rate of interest. I refer in this, more particularly, to the prosperity of landholders generally, or of that very numerous class, which have been denominated, the *substantial yeomanry*.

Good farming is an art which requires a *capital*. And none can be more fully sensible of this important fact, than our eminently distinguished practical farmers, and especially those, who, living in the vicinity of our Capital, contribute so largely to the supplies of its markets. Even the preparation and recovery of first-rate lands, which have been exhausted, or for a length of time neglected, and before the cultivation begins, is an expense, of itself, by no means inconsiderable, and to bring them up, and at once, to a state of high fertility. Residing, as I do, in a fertile region, and but six miles from the centre of the city, this fact *I know*, and that it costs as much in the first instance, generally, and in many even more, than the whole value or cost of the land itself, in this day, to prepare such grounds for highly profitable cultivation. Once prepared, they may retain their fertility for three years, producing numerous and profitable crops; but at the end of this period, they will again require a new, but less expensive preparation.

By a gentleman, (the Hon. John Lowell,) who has resided, or travelled, during several years, in various parts of Europe, the public have been informed, that in those parts of England where farming has been carried to a very high state of perfection, that the *tenant of the land*, previous to entering upon a large farm, on a long lease, must first of all, be provided with an amount of capital, which would astonish a noviciate of our own country. He has stated, and we believe that his testimony must always be true, that a tenant on a long lease, on a farm of the first magnitude, in great, aristocratic, old England, requires a capital of £10,000 sterling, before he is prepared to begin farming; I state the amount from memory, but am positive I cannot be mistaken.

Whether the land has been duly prepared or not, the labor of cultivation is usually *the same*, but the difference in the actual profits may be *infinitely great*; since, in the one case, the profits of the labor on the penurious soil, are all absorbed and lost to the cultivator; while, on the land which has been suitably prepared, the buntiful harvests and eminent prosperity are the just recompense of the husbandman; and his very great reward, though it comes not so quickly, it comes surely.

It must be, I think, sufficiently obvious to every one who has thoroughly examined the subject, that my premises *must be true*; but how is this capital, so indispensably necessary in the commencement to every farmer, to be obtained?

It is true, that in our country, and especially in our great city capitalists, and moneyed institutions, of various names and natures, and with abundant disposable funds, do exist, and much abound. Yet, as if with one common consent, the farmers are more or less explicitly told by them, that "*they have no money to loan on a pledge of lands in the country*," or that "*it is contrary to their rule*." This is almost the only answer which they ever receive, *or ever will receive*, while this law which limits the rate of interest to six per cent. is permitted to exist.

It is but justice here to say, that there have been, and still are, highly benevolent individuals in the city, as well as in the country, who have been the exceptions to this general rule.

Thus cut off from the abundant and needful resources,—thus paralyzed,—*thus unequally circumstanced*,—the farmer is compelled, through the influence of this baneful law, to till the sterile fields in abject poverty; or by inexorable necessity, to sell or to sacrifice his lands, which the same laws have *degraded* and *made unavailing*—to sell, perchance, to the *capitalist*, and to become himself an exile. He forsakes his native country; driven by relentless fate, he forsakes, without regret, his exhausted soil, and hies him to the *distant West*, to new lands and a far distant country, where our numerous and devoted population have been fast hastening, and from the same desolating cause, for forty years, in the flood tide of emigration, to return no more.

In times of scarcity and distress, and when money is always of more worth than the present legal rate of interest, the law operates as a bounty chiefly and exclusively to those who indirectly evade its provisions, defying alike the law and its penalties. But the cost of its violation is borne by the necessitous borrower, who is compelled to pay the full value, or unlawful interest, and also the cost of the negotiation.

In such a state of things, and in this critical stage of the conflict, many capitalists withdraw from the competition and from the money market, purely on account of this law, thereby augmenting still further the general distress. New acts of incorporation are called for, with new powers and privileges, or they are induced to send their capital abroad, to the upbuilding of other States, and countries, and cities, where laws so utterly unworthy of the enlightened age and community in which we live, do not prevail; and where the lands in the country, and in the vicinity of their cities, are duly appreciated, and have risen in value, in a measure, *from this cause*, and in a degree fully commensurate with the increase of wealth and of population.

Yet there may be, indeed, at times, many capitalists who, not having any immediate use for their abundant funds, would willingly invest them on the most safe security, at a rate of interest *even less than the present legal rate*, were this law repealed; knowing that *then* they might be assured of repayment at the time required; the borrower being in this case, permitted to exercise *the right*, unrestrained by law, *to repay him*, by borrowing of another, even at an advanced rate of interest, if he pleased.

Far be it from me to ascribe *fault* to our capitalists generally, and without cause; their characters are well known and duly appreciated, and on the score of liberality, will not, as I trust, suffer by a comparison with those of any country or city on earth. The fault is in *our laws*, and not in *them*. In our legislators, who have invented a crime which men do not regard as a *moral crime*. The law, which, as an experiment, was undoubtedly intended only for good, has been the means of *organizing evil*, and has become, of itself, the source of evils *infinitely greater* than any which it was designed *to prevent*. The law which expels capital from the State, has expelled also our own citizens. WILLIAM KENRICK.

Nonantum Hill, Newton, Jan. 26, 1836.

CINNAMON FIELDS OF CEYLON.—August 31.—Our morning was, as usual on a first arrival, taken up by visits; in the afternoon we drove in Sir E. Barne's sociable, through the far famed cinnamon gardens, which covered upwards of 17,000 acres of land on the coast, the largest of which are near Colombo. The plant thrives best in a poor, sandy soil in a damp atmospher; it grows wild in the woods to the size of a large apple tree, but when cultivated, is never allowed to grow more than ten or twelve feet in height, each plant standing separate. The leaf is something like that of the laurel in shape, but of a lighter color; when it first shoots out, it is red, and changes gradually to green. It is now out of blossom, but I am told that the flower is white, and appears, when in full bloom, to cover the garden. After hearing so much of the spicy gales from this island, I was much disappointed at not being able to discover any scent, at least from the plants, in passing through the gardens. There is a very fragrant smelling flower growing under them, which at first led us into the belief that we smelt the cinnamon, but we were soon undeceived. On pulling off a leaf or twig you perceive the spicy odor very strong, but I was surprised to hear that the flower had little or none. As cinnamon forms the only considerable export of Ceylon, it is of course preserved with great care; by the old Dutch law, the penalty for cutting a branch was no less than the loss of a hand; at present a fine expiates the whole offence. The neighborhood of Colombo is particularly favorable to its growth, being well sheltered, with a high equable temperature; and as showers fell frequently, though a whole day's heavy rain is uncommon, the ground is never parched.—[Bishop Heber.]

The U. S. Government has millions of acres in Florida, which, there is little cause to doubt, would produce as good cinnamon as Ceylon, but which are of no use to any human creature. Would it not be good policy to give a small tract to any suitable person, who would undertake to try the experiment?—[ED. N. Y. F.]

COMMON ROADS AND BRIDGES IN THE STATE OF NEW-YORK.

Being the Report of a Committee appointed at the Internal Improvement Convention held at Utica, to collect information on the subject.

The Committee appointed at the Convention lately held at Utica, on the subject of Common Roads, beg leave to report, that, pursuant to the resolution of the Convention, a circular was addressed to the clerks of the several towns in the State, requesting information as to the length of the public and turnpike roads, and the number of bridges in their respective towns, together with the annual cost of keeping them in repair. Answers have been received from 266 towns, and at the time of making the report answers are daily coming in, so that hopes are entertained of making a complete statement of the annual cost of the roads of the State from actual returns. The results of the answers already received show that in 266 towns, having 523,488 inhabitants, the length of public roads is 19,924 miles.

The number of days' work annually assessed for their repair is	416,271
The amount of money annually expended in addition for the same purpose,	$23,931

The length of turnpike roads is 579 miles.

The annual expense of repairing the same	$9,816
The number of bridges	1221
The annual expense of repairing the same	$32,962

The whole number of towns in the State is 791, and the towns making returns are about one-third of the whole, but the population returning is scarcely two-sevenths of the whole population, and the returns therefore may be fairly estimated at that ratio. According to that rule we have the following results:

Length of all the public roads in the State	69,734 miles
The number of days' work assessed for their repair	1,456,948
The additional money expended for the same purpose	$84,258
The number of public bridges	4,274
The annual cost of keeping them in repair	$115,363

Estimating the value of each day's work at 75 cents, and the assessed labor will amount to the sum of $1,092,711, to which the sum of $84,258 must be added, and we have the enormous sum of $1,176,969 annually expended in the State of New-York for repairing common roads, besides $115,363 annually expended for the repair of public bridges, besides double that sum in constructing new ones. This, too, it must be recollected, is independent of the sums expended for turnpikes and toll bridges.

If this vast sum expended in each year had produced results proportionate to its amount; if it had effected any visible or permanent improvement in the condition of the common roads, the public might be reconciled to the burden thus annually imposed.

It is manifest, however, that no such improvement is to be found. On the contrary, the public roads in this State have not visibly improved for years. Their condition in those seasons of the year when good roads are required is intolerably bad. No epithet, however strong, can properly characterise their wretched state. When the snow has covered them in the winter, and when the summer's sun has dried and improved them, they are passable; but when these natural agents cease to exert their beneficial influence, and their improvement is left to man, judging only from the results, we should conclude that his sole object was to confine the traveller by walls and fences to an artificial ditch, and so prevent him from availing himself of the natural surface of the fields on either side of the road to accelerate his journey.

Such are the results of the present system, expensive and burdensome as it is to the people of the State. Your Committee are naturally led to inquire into the causes of its total failure.

Among these we are induced to assign the foremost place to the incapacity and inefficiency of the agents appointed to carry the road laws into effect.

The path-masters do not seem to have the least knowledge as to the true principles upon which roads should be constructed. Instead of properly locating, grading, ditching, and constructing a road of hard materials, they content themselves with laying out a road, not according to the face of the country, but so as to suit the views of the owners of land upon the route; and the grading, ditching, and providing the materials is one operation—consisting of dragging earth and generally vegetable mould from the sides to the centre of the space appropriated for the road, to be levelled, graded, and packed by the wheels of the wagons passing that way.

Roads of this description, made by heaping up mud from the sides, must necessarily be muddy in rainy weather. There is no charm in the action of the carriage wheels to prevent the earth taken from the ditches from becoming mud on the road as well as on its sides. It consequently is soon carried from the road to fill up the side ditches, and the whole becomes in the fall of the year a quagmire, where there is no choice between the road and the ditches. The least reflection as to the nature of roads will show, that no other result could be expected.

A road is an artificial contrivance or machine for facilitating the transportation of heavy loads, and its efficiency depends upon the perfection of its construction. For instance, upon the common roads in their present condition 30 bushels of grain are considered a load for a pair of horses, while upon a Macadamised road the same team can transport with the same exertion 75 bushels.

The obstacles to be overcome are friction and gravitation, which are increased, the first by the softness of the road, and the second by its deviation from a level line.

The proper remedies for these difficulties are to lay out the road as far as practicable through a level country, and to construct it of hard materials, so cemented together that they present a smooth and level surface for the wheels to move upon. The former remedy can be applied by any surveyor who will take the pains to examine the face of the country through which the road is to pass, with the view of selecting a practicable route. The other remedy is more difficult of attainment. Where stones can be procured, it is necessary that they should be broken to a size that they can unite with the body of the road, and thus form one mass. Large stones only serve to break up the road, and to render it rough and impassable.

After a full trial upon the roads of England, MacAdam came to the conclusion that no stone should be used in covering a road that could not be passed through a ring 2 1-2 inches in diameter. Stones of greater size do not cement with the others, and remain to break up the surface of the road.

Another difficulty to be overcome grows out of the action of the elements upon the road. Moisture and frost are the great destroyers of roads, by alternately softening and breaking the surface. To prevent this the road, while its surface should be hardened so as to prevent the moisture from penetrating, it should be so formed that the water will readily run off to the sides, where there should be ditches connected with the natural water courses of the country. The road will thus be kept dry, and the frost will have comparatively little effect upon its surface. The best shape of a road of 30 feet breadth is a segment of a flat ellipsis, with the side channels about nine inches below the surface in the middle. This shape facilitates the passage of the water to the sides, and when the surface is properly constructed will keep it dry and hard.—The ditches should be sufficiently deep to be below the bottom of the metal or materials used in making the road to serve the purpose of draining, and in April and October they should be cleared out so as to afford an easy passage for the water from the road.

The draining under the present system requires a complete reform, as it is of the greatest importance, and requires no great expenditure. With a surface constructed of broken stones cemented into one mass, and with good drains, roads are enabled to resist the action of the elements, and the large expenditure made in their construction is amply repaid by their greater efficiency and durability.

In some parts of the State, however, as, where clay predominates, there is a difficulty in procuring stones of the kind used in constructing roads. This does not often happen, and when it does there is an abundance of material to supply the deficiency. Bricks may be used, as in Holland, to form good roads, and when of suitable form and united with mortar, they will make a covering for a road equally capable with broken stones of resisting the action of the elements. These bricks should be much larger than the ordinary building bricks, burnt hard and placed in mortar upon a surface properly shaped and graded, so as to form a covering for the ground impervious to water.

It has also been suggested that in those parts of the State where lumber is cheap, that good roads might be economically made by using wood to cover their surface.—This may be done either in the mode adopted in Russia, by placing square blocks upright upon the ground, and so closely packed together as to present a smooth and compact surface; or the track may be covered with planks raised a few inches from the ground, united together like a continuous bridge—the planks being placed across the road where undulating, and lengthwise where level.

Either of these modes would form hard and level roads, and although the committee are not prepared to express an opinion as to their relative cost and duration, they are fully satisfied that either mode would be economical compared with the wasteful and useless expenditure of money and labor made under the existing system. From the best information to which the committee has had access, they estimate the cost of a road thirty feet track properly Macadamised to be $5000 per mile; one of burnt clay $4000; one of wooden blocks $4000; one of planks $3500. These, however, are mere estimates, and may vary much from the truth.

It would probably be the wisest policy to adopt the Macadamised system where practicable, and to make portions of roads upon each of the other modes in order to bring them all to the test of experience.

On one point, however, there is no doubt in the committee that the present system should be entirely abandoned, and a mode adopted which shall sooner or later give a hard and uniform surface to the public roads. This is necessary, not only to facilitate the transportation of the produce of the State to market, but to redeem the community from the reproach of annually expending millions without effecting or even approximating to the object proposed by the framers of the law relating to common roads.

The mode of effecting that reform is a subject admitting of different opinions. To undertake at once to Macadamise all the roads in the State would be an effort, in the opinion of many, beyond the ability of the community. The cross roads in counties are not enough travelled to warrant such an expenditure at this time, and in general they are in better order than the more frequented roads. While the system of repairing roads, therefore, requires a total change in the agents employed to superintend its execution, it would probably be the best policy to apply the reform in the mode of constructing roads in the first instance to the post routes, and to devote the greatest portion of the money raised to rendering them perfect before undertaking those of minor importance. When those are once well constructed the annual expense of keeping them in order will be small, and the reform of the other roads upon the same principles can then be undertaken, until the public roads throughout the State shall be put in perfect order.

The changes which your committee think could be advantageously made in the present system with the view of producing such a result, are an alteration of the present law so as to establish five road commissioners in each county, who shall be empowered to order the construction and repair of all the stage roads, and to employ a surveyor, under whose superintendence these roads shall be constructed and repaired. Instead of assessing the farmer so many days' labor, the assessment should be made payable in money or in broken stone of the proper size and kind, to be delivered at specified places —such a quantity of stone to be an equivalent to a day's labor. The roads then could be repaired under the immediate superintendence of the surveyor, who should be held responsible to the commissioners for their condition.

What is done in this way would then be thoroughly done, and in a few years the marked improvement of the roads would demonstrate the superior economy of those thus constructed.

Indeed so strongly is the committee impressed with the advantages of at once commencing this reform upon an extensive scale, that they would recommend the anticipation by way of loan on the credit of the State of one half of 20 years' assessments, the amount raised to be rateably divided, and at once applied under proper superintendence to the construction of the principal stage roads in the several counties of the State.

Inasmuch as the amount now annually raised for the repair of roads equals $1,176,969; this sum to be thus raised by loan would be $11,769,690, which could be immediately applied to the construction of those roads, leaving the sum of $588,484 to be annually raised by assessment, and applied to the repair of roads, and a like sum to be appropriated to the repayment of the loan. To this might be added the tolls to be collected on particular roads, in case the Legislature should deem it expedient to make those who used the roads contribute, as in England, to their maintenance and repair. To this mode of maintaining roads may be fairly attributed the excellence of those in England, where the roads of particular districts are placed under the control of trustees, who have authority to manage the roads as a productive estate, and who are thus enabled to improve the roads at the expense of those who use them—borrowing money for constructing and repairing them, and repaying its principal and interest from the proceeds of the tolls.

If, after determining upon the construction of the principal roads upon proper principles, similar powers should be given to the County Commissioners for Roads, a great reform would be effected, and the means of transporting produce to market much facilitated, without increasing the annual assessments. The importance of this improvement in common roads would well justify such a step on the part of the State. With good roads, every farmer in the State would be enabled, at a comparatively small expense, to carry produce which is now useless to market. The difference in the expense of transportation to the first purchaser, so important an item in the ultimate cost of produce, would be 50 per cent., making a diminution of one half of the present cost. Taking the average amount of produce raised on a farm of 100 acres, beyond what is required for the use of the farmer, to be equivalent to 400 bushels of grain—an amount believed to be below the real quantity; and with the present roads fourteen journies to the market town, with a two horse wagon, will be required to transport it to market—a labor which, if the average distance of each farm be estimated at 10 miles, would employ a wagon, horses and driver, fourteen days. With Macadamised roads, the same labor could be performed in six days, with more ease to the horses and less injury to the wagon, making a saving to every farmer in the State, of eight days in the transportation of the produce of a small farm, and a saving proportionably greater upon larger farms.

This illustration of the superior economy of good roads might be applied to other branches of industry, and their results would show an enormous expenditure of time and money thus indirectly made by the people of the State, in transportation on bad roads, to the amount, probably, of $10,000,000 annually, a sum sufficient to put all the roads of the State in good order. This saving in time and money is not the only benefit that would accrue to the State from the adoption of the policy proposed. By the expenditure of the principal sum raised by loan, in constructing and repairing roads in the several counties, money would be circulated, labor employed, and the energies and enterprise of the whole community would be stimlated by the actual e xecution of a policy calculated to diffuse the benefits of public improvements throughout the State—not advancing one part at the expense of the whole, but giving to each county its just share, and conferring upon all equal, and at the same time, substantial benefits. Among these may be mentioned a more rapid increase of the population of the State.

With good roads the second and third class of lands may be made equally productive with the most fertile, where the roads are bad—the difference in the expense of transportation being more than an equivalent to the difference in the quantities produced.

Emigration from the State will be thus checked, and the better and more substantial class of emigrants from other States will be induced to settle here. A similar policy is recommended in relation to the construction of bridges. All the bridges over small streams, and many of those over the large rivers, should be made of stone, or brick, where stone cannot be procured. Such structures would be permanent, requiring little or no repair, and though more expensive in the construction, are more economical than wood, when the expense of construction and repair is spread over twenty years.

A similar mode might be adopted in constructing the bridges, i. e., dividing the annual assessments into two parts, the first to be appropriated for twenty years to the extinguishment of a loan equal to one half of twenty years' assessment, the loan to be applied, under the direction of the *State*, in constructing permanent bridges in the several counties, and the residue to be used for keeping those in repair, whose permanent construction is to be postponed.

Your Committee are aware that the policy recommended is liable to the objections that it will involve great expenditure, and that it is novel. Objections always ready with the timid, the unenterprising, and those who deem the existing condition of things as not susceptible of improvement.

The policy recommended, however, is not meant merely for the present generation. Like the public buildings and the canals of the State, and the aqueducts of cities, roads are intended to be permanent. They belong to the State, an existence that is to last through ages, and her public works should all be constructed with reference to an equally enduring existence. Economy in a State is not consulted in limiting the expenditure to merely what serves the present occasion; but in looking forward beyond the wants of the present generation, and having carefully consulted the ability of the community, proportioning the expenditure to the importance of the object to be attained.

The subject referred to the Committee they deem of the highest importance, whether considered in reference to the present or the future, and they recommend that a memorial should be addressed to the legislature, expressing the views set forth in this report.

All which is respectfully submitted, in behalf of the Committee.

J. Blunt, Chairman.

New-York, Jan. 9, 1836.

THE FOLLOWING TABLE EXHIBITS THE RETURNS WHICH WERE RECEIVED FROM TOWN CLERKS.

Albany County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Coeymans,	2723	85½	2105	$125	5¾	$504	$475
Knox,	2189	75	1413	30			30
Rensselaer,	3685	160	258	190	20	300	
	8597	310½	3776	$345	25¾	$805	$505

Coeymans, 24 bridges. Knox, 3 bridges. Total, 27 bridges. 7 towns, having 44,923 inhabitants, made no returns.

Alleghany County.

Allen,	898	72	690	$200			
Amity,	872	75	1271	250			$500
Belfast,	743	50	700				250
Birdsall,	543	61	412	50			
Bolivar,	449	75	675	250			
Genesee,	219	27	360	250			
Haight,	655	53	1185	100			
Portage,	1839	150	1750	250			200
Rushford,	1115	60	1039	250			120
Scio,	602	19	716	250			200
	7941	642	8798	$1850			$1270

Allen, 7 bridges. The $200 applies mostly to bridges. Amity, 15 bridges. Belfast, 16 bridges, of which one is built by the county, costing $1000. Birdsall, 4 bridges: expense of bridges included in expense of roads. Genesee, no expensive bridges; roads mostly new. Portage, 10 bridges. Rushford, 21 bridges. Scio, 4 bridges. Total, 77 bridges, on which 400 days work in addition are given. 16 towns, having 18,335 inhabitants, made no returns.

Broome County.

Lisle,	4378	40	1107½	$	8	120	
Nanticoke,		35	220				
Vestal,	946	107	1000	75			
Windsor,	1280	120	1760				100
	6604	302	4087½	$75	8	120	100

Lisle, 3 bridges, which cost $1,400. Windsor, 1 bridge. Total, 4 bridges. 7 towns, having 10,975 inhabitants, made no returns.

Cattaraugus County.

Franklinville,	903	68	1159	83	21	221	332
Fudom,	1505	95		1280			150
Hinsdale,	919	70	1250	250			230
Machias,	735	57	900				75
Napoli,	852	75	1392				
New Albion,	380	67	1016				25
Perrysburgh,	2440	140	2959	250			
	7734	572	$776	1863	21	221	812

Franklinville, 17 bridges. Fudom, 10 public bridges. Napoli, no public bridges, excepting those built by the town; roads in bad condition. New Albion, 2 bridges, which cost $206.00. Total, 29 bridges. 14 towns, having 8,990 inhabitants, made no returns.

Cayuga County.

Niles,		99	1740	22			
Auburn,	4486	17¾	2480		2		
Ledyard,	2427	75	223	50			100
Locke,	3310	42	1241½				50
Mentz,	4143	100	2946				200
Sennet,	2297	70	2384		5½	275	
Scipio,	2691	54	1918½				
Sterling,	1436	80	2000	200			
Sumner Hill,		48	1000				
Victory,	1819	68	1693				25
Moravia,		55	1400				15
	22609	708¾	18976	272	7½	275	390

Niles, in 1834, there were expended on the roads $120. Auburn, 4 bridges. Ledyard, 5 bridges. Mentz, several bridges. Victory, 3 bridges. Total, 12 bridges. 12 towns, having 25,389 inhabitants, made no returns.

Chatauque County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Busti,	1680	50	1552	50			
Carroll,	1015	100	1142				250
Charlotte,	886	50	1279½	163			
Ellicott,	2101	73	2177	800			700
French Creek,	420	27	450				250
Mina	1388	52	1041				30
Pomfret,	3380	119	3235½		40		350
Portland,	1771	56	1352				162
Ripley,	1647	80	1682½	60			100
Sherman,		59	867	150			
Stockton,	1605	72	1511				160
Westfield,	2477	83	2619				250
	18370	821	18907½	1223	40		2252

Carroll, 10 bridges. Ellicott, 8 bridges. French Creek, 8 bridges. Mina, 5 bridges. Sherman, 2 bridges, which cost $150 each; some smaller ones, which cost from 40 to 60 dollars. Stockton, 6 public bridges, besides several smaller ones. Total, 39 bridges. No returns from 12 towns, having 16,301 inhabitants.

Chenango County.

Columbus,	1661	65	1300		6		
Coventry,	1576	60	1083		7	80	
Green,	2962	167	2049	211	10	100	4600
Linckleau,	1425	30	727				
Macdonough,	1232	80	1365½				
Oxford,	2943	100	2330	100	4		175
Preston,	1213	50	1155				16
Smithville,	1859	100	1240				
	14671	652	11249½	311	27	180	4791

Green, 3 bridges. Preston, 25 public bridges, generally supported by an annual tax. Total, 28 bridges. No returns from 11 towns. having 22,567 inhabitants.

Clinton County.

Beekmantown,	2391	150	1350	250	6		150
Champlain,	2456	88	1665	50			300
Plattsburgh,	4913	120	4500				
	9760	358	7515	300	6		450

Beekmantown, 25 bridges. The turnpike is a military one, made at the expense of the United States. Champlain, 24 bridges. Plattsburgh, 14 bridges, one cost $2000, 1 cost $1800, 2 cost $1500, 10 cost about $3000. Cost of repairing roads and bridges differ from $250 to $500. Total, 63 bridges. No returns from 5 towns, having 9584 inhabitants.

Columbia County.

Stockport,		25½	1520				750
Austerlitz,	2245	100	1100		8	300	75
Canaan,	2063	40	2000		6	100	50
Claverack,	3000	72	1560		13	650	400
Clermont,	1203	34	587				300
Copake,	1676	135	1270		8		120
Ghent,	2783	75	1535	325	8	448	
Taghkanich,	1654	60	1000	250			
	14624	541½	10572	575	38	1506	1695

Stockport, 12 bridges. Canaan, 1 bridge. Claverack, 23 bridges. Clermont, 7 bridges; one wholly supported by the town. Copake, 20 bridges. Ghent, the expense of bridges included in that of roads. Taghkanich, 4 bridges: their expense included in that of roads. Total, 67 bridges. No returns from 10 towns, having 25,293 inhabitants.

Cortland County.

Cincinnatus,	1308	60	1200				
Cortlandville,	3673	110	2635	1			200
Freetown,	1051	36	644				20
Homer,	3307	80	2100				
Marathon,	895	50	950	150			882
Preble,	1435	46	867½				50
	11669	382	8396½	151			1152

Cortlandville, 5 bridges. Preble, 7 public bridges. Total, 12 bridges. A Railroad is anticipated. No returns from 5 towns, having 12,122 inhabitants.

Delaware County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Andes,	1860	85	1422				
Bovina,	1340	89	997				
Colchester,	1424	110	1313	68			
Hancock,	766	90	832	250			
Harpersfield,	1976	100	1300		12		
Middletown,	2303	140	1951	250			50
Tompkins,	1774	90	1547	200			
	11531	704	9362	768	12		50

Andes, 1 bridge, cost $500, now in a useless condition. Colchester, 1 bridge, cost $1250, another is contemplated by the inhabitants, which will probably cost $1200 or $1500. Total, 2 bridges.

Dutchess County.

Amenia,	2389	60	1839		7	170	17262½
North-East,	1689	70	1000				
Pleasant Valley,	2419	55	1350		6¼	unk'n	100
	4168	185	3689		13¼	170	273½

Amenia, 8 bridges. Pleasant Valley, 3 public bridges. No returns from 15 towns, having 46,758 inhabitants.

Erie County.

Lancaster,		50	1750				250
Amherst,	2485	125	2605				500
Aurora,	2423	80	2606				250
Boston,	1521	77	1446	250			400
Clarence,	3360	7*	200				5
Collins,	2123	100	3250	150			100
Concord,	1895	220	1884	200			170
Hamburgh,	3351	75	4000	50			250
Newstead,	1926	17	1438	188			
Wales,	1470	60	1716				838
	20556	811	20695	838	4		1925

Lancaster, 9 bridges. Amherst, 16 bridges. Aurora, 13 bridges; $250, not enough for repairing bridges, should be $500. Boston, 7 public bridges; roads in bad order. Clarence, the clerk has returned only the stage road. Collins, 15 brides. Hamburgh, 10 public bridges. Newstead, 3 bridges, which cost about $500. Wales, 18 bridges. Total, 91 bridges. * Stop Road.

Franklin County.

Malone,	2207	90	1700	$250			$100

12 bridges. 14 towns, having 17,080 inhabitants, making no returns.

Genesee County.

Alabama,	816	75	1625	$250			$40
Bergen,	1508	42	1031	100			50
Bethany,	2374	60	1600	250			
Byron,	1936	75	1682				
Castle,	2264	80	1995				
Darien,		74	2500				200
Elba,	2678	125	2185	250			
Java,		60	2200	200			20
Middlebury,	2416	72	1626	92			40
Perry,	2792	75	1674	130			96
Warsaw,	2474	70	1810	250			
	19258	808	19928	1522			446

Alabama, 2 State bridges; causeway, or log road, the dearest and worst, in the long run. Bergen, 3 bridges. Bethany, 10 bridges. The ordinary means authorised by law wholly inadequate to render roads and bridges permanently good. Byron, 12 bridges, 2 of which cost for rebuilding, $500, last year. Castle, 3 bridges, which cost $350 to build. Darien, 12 bridges; this returned from Darien Centre. Java, 2 bridges; only $75 have been received this year, for repair of roads. Middlebury, 7 bridges. Total, 51 bridges. No returns from 14 towns, having 32,889 inhabitants.

Greene County.

NAME OF TOWN.	Population	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Hunter,	1960	60	1094	$100	10	$700	
Lexington,	2548	95	1700	150			$100
New Baltimore,	2370	70	1685		11	unk'n	350
Windham,	3476	85	1800	75	13	800	
	10349	310	6274	325	34	1500	450

Lexington, 2 bridges. New Baltimore, 3 large bridges, several smaller ones, and are a heavy burden. Windham, 4 expensive bridges. Total, 9 bridges. No returns from 6 towns, having 19,176 inhabitants.

Jefferson County.

Adams,	2995	80	2250				$100
Alexandria,	1523		1650				250
Le Ray,	3430	125	2000	$100			150
	7948	205	5900	100			500

Adams, 7 bridges. Alexandria, 6 bridges. Le Ray, 6 bridges. Total, 19 bridges. No returns from 15 towns, having 40,567 inhabitants.

King's County.

New Eutrecht,	121	17	735				

No returns from 5 towns, having 19,318 inhabitants.

Lewis County.

Pinckney,	783	50	486½	100			507

Pinckney, 3 bridges. No returns from 10 towns, having 14,175 inhabitants.

Livingston County.

Caledonia,	1618	50	1409	$59			
Geneseo,	2675	82	2754	150			
Groveland,	1703	94	1200	250			$250
Leicester,	2042	75	2250	75			425
Livonia,	2665	100	2200				70
Sparta,	3777	106	2796½	250			200
Springwater,	2253	63	1800				
York,	2636	80	2937½	107			60
	19369	650	17338	$891			$1005

Geneseo, 2 bridges, besides several smaller ones; one rebuilt in 1833 at a cost of $2770; the other to be rebuilt at a cost of $3000. Groveland, 7 public bridges, costing from $50 to $100 each. Leicester, $525 appropriated, this year, being $100 more than usual. Livonia, 7 bridges. Sparta, 8 bridges. York, 3 bridges. Total, 27 bridges. No returns from 4 towns, having 8350 inhabitants.

Madison County.

Georgetown,	1094	40	712		1		
Hamilton,	3220	100	2400		16		
Madison,	2544	70	1800		6		$120
	6858	210	4912		23		$120

Georgetown, several bridges. Hamilton, 16 bridges; $800 appropriated for builiding stone butments to 2 or 3 of said bridges. Total, 16 bridges. No returns from 10 towns, having 32,179 inhabitants.

Monroe County.

Chili,	2010	98	1319	50			250
Clarkson,	8251	124	3000	200			100
Gates,	7117	56	1641	150			
Henrietta,	2310	70½	1945½	250			
Mendon,	3057	96	2226				250
Pittsford,	1032	15	1488	50			33
Rush,	2101	70	1963				200
Sweden,	2938	72	2753	50			
Wheatland,	2239	60	1875				150
	26855	661	18210½	750			933

Chili, 9 bridges. Clarkson, 14 bridges. Gates, 2 bridges to build, which cost $100. Henrietta, few bridges, which are but of trifling expense. Mendon, 30 bridges. Pittsford, 4 bridges. Rush, 3 bridges. Wheatland, 4 bridges. Total, 66 bridges. No returns from 7 towns, having 23,007 inhabitants.

Montgomery County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Amsterdam,	3354	82	2681		12	600	150
Ephratah,	1818	66	1660	60			500
Mayfield,	2614	114	1623	40			200
Northampton,	1392	79½	977				300
Stratford,	552	50	402				325
Lake Pleasant,	266	62	243				150
	10001	453½	7526	100	12	600	1625

Amsterdam, the roads are in a very bad condition. Ephratah, 22 bridges. Mayfield, 20 bridges. Northampton, bridges are numerous. Stratford, 27 bridges. Lake Pleasant, 5 bridges. Total, 74 bridges. No returns from 13 towns, having 34,917 inhabitants.

Niagara County.

Hartland,	1584	85	2400	150			25
Porte,	1491	70	1173	250			
Somerset,	871	61	1122	100			
	3945	216	4695	500			25

Hartland, 5 bridges. Porte, the expense of bridges included in days' work. Somerset, the roads generally bad, opportunity for making them good. Total, 5 bridges. No returns from 8 towns, having 14,540 inhabitants.

Onondaga County.

Tabius,	3071	76	915		10	$125	
Onondaga,	5668	121	2123	$60	9	50	
Pompey,	4812	140	3550	4	2	unk'n	213
Skaneateles,	3812	85	3555	250	7¼	50	
	17363	422	10143	314	28¼	225	213

No returns from 13 towns, having 41,611 inhabitants.

Ontario County.

East Bloomfield,	3861	75	1710				$100
Bristol,	2952	250	1180				225
Canandaigua,	5162	152½	4064½		2	$100	237
Hopewell,	2202	70	1330	$20	6	258	97
Manchester,	2811	72	2245				200
Naples,	1943	45	1425	100			100
	18931	664½	11954½	120	8	358	959

East Bloomfield, 4 bridges. Bristol, 12 bridges. Canandaigua, 6 bridges. Hopewell, 8 bridges. Manchester, 5 bridges. Naples, 12 bridges. Total, 57 bridges. No returns from 8 towns, having 21,236 inhabitants.

Orange County.

Crawford,	2019	62	2120		6		$250
Goshen,	3361	80	2032		8		50
Hamptonburgh,	1365	51	1123				250
Montgomery,	3885	100	2626		8	$160	123
Warwick,	5009	175	3860	$600	20		250
	15639	468	11761	600	42	160	923

Hamptonburgh, 6 bridges. Montgomery, 6 bridges. Warwick, several bridges. Total, 12 bridges. No returns from 9 towns, having 29,727 inhabitants.

Orleans County.

Gaines,	2121	68	1214				$100
Shelby,	2048	85	2000	$92			200
	4169	153	3214	92			300

Gaines, 5 bridges. Shelby, 7 bridges. Total, 11 bridges. No returns from 6 towns, having 14,604 inhabitants.

Oswego County.

Hastings,	1494	75	1900	250			
Mexico,	2571	175	2604	75			125
Oswell,	501	16	440	250			100
Palemo,		50	1500	100			
Parish,	968	65	683	55			65
Redfield,	341	31	300	250			
Volney,	3629	75	2052	137			
	9604	487	9479	1117			290

Oswego County—(continued.)

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Burlington,	2459	80	1500				
Decatur,	1110	40	750				
Edmeston,	2087	75	1268¾		6	90	
Exeter,	1690	40	1000				
Middlefield,	3323	112	1870½		16		350
Otego,	1148	100	1907		5	unk'n	150
Otsego,	4363	120	2000	370	8		300
Plainfield,	1626	60	1070		2	10	
Richfield,	1752	24	1287½	50	9	220	30
Unadilla,	2313	86	1660	100			115
Westford,	1645	63	1273				
	23497	800	15586¾	520	46	320	925

Hastings, roads in a wretched condition. Mexico, 30 bridges. Oswell, 3 bridges. Redfield, 7 bridges. Volney, expense of bridges included in that of roads. Total, 40 bridges. No returns from 14 towns, having 17,500 inhabitants.

Otsego County.

Burlington,	2459	80	1500				
Decatur,	1110	40	750				
Edmeston,	2087	75	1268¾		6	90	
Exeter,	1690	40	1000				
Middlefield,	3323	112	1870½		16		350
Otego,	1148	100	1907		5	unk'n	150
Otsego,	4363	120	2000	370	8		300
Plainfield,	1626	60	1070		2	10	
Richfield,	1752	24	1287½	50	9	220	30
Unadilla,	2313	86	1660	100			115
Westford,	1645	63	1273				
	23497	800	15586¾	520	46	320	925

Middlefield, 6 public bridges over Cherry Valley creek, and one-half of 2 bridges over the Susquehanna. Otego, 6 bridges. Otsego, 20 bridges. Plainfield, 5 bridges. Richfield, several bridges. Unadilla, 5 bridges. Total, 42 bridges. No returns from 12 towns, having 27,875 inhabitants.

Putnam County.

Patterson,	1529	50	1150				

No returns from 4 towns, having 11,099 inhabitants.

Queen's County.

No returns.

Rensselaer County.

Berlin,	2019	40	1200	500	6	unk'n	
Grafton,	1681	67	1400	50			
Greenbush,	3216	70	1670		14	700	250
Petersburgh,	2011	60	1621¾				800
Schaghticoke,	3002	40	1750		8	180	500
	11929	277	7542¾	550	28	880	1550

Berlin, the $500 is much more than is usual. Petersburgh, 30 bridges. Schaghticoke, 6 bridges. Total, 36 bridges. No returns from 9 towns, having 37,495 inhabitants.

Richmond County.

No returns.

Rockland County.

Ramapo,	2837		1725		6		200

No returns from 3 towns, having 6551 inhabitants.

Saratoga County.

Corinth,	1412	80	1150				
Edinburgh,	1571	60	1024				25
Providence,	1579	67	1203				
Saratoga,	2461	87	1844	250	7	210	500
Sar. Springs,	2264	60	1723				200
Waterford,	1473	7	870		2	80	10
	10760	361	7814	250	9	290	735

Edinburgh, a float bridge. Providence, the bridges are kept in repair by labor assessed. Saratoga, 7 bridges. Saratoga Springs, 10 bridges: there is a railroad in the town, 5 miles long, which cost $50,000: the bridges cost $7,000. Waterford, 10 bridges. Total, 28 bridges. No returns from 14 towns, having 27,919 inhabitants.

Schenectady County.

No returns.

Schoharie County.

Cobleskill,	2988	62	2323		7		75
Jefferson,	1743	80	1200		8	60	
	4731	142	3523		15	60	75

Cobleskill, 3 bridges. No returns from 8 towns, having 25,171 inhabitants.

Seneca County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Covert,	1791	63	1550				
Fayette,	3216	86	2867	250	12		350
Lodi,	1786	61¼	1307½	50			218
Junius,	1583	55	950				
Romulus,	2089	70	1500	15			235
	10460	335¼	7774½	315	12		803

Lodi, 7 bridges. Romulus, the bridges are short and high. Total, 7 bridges. No returns from 6 towns, having 10,581 inhabitants.

St. Lawrence County.

Brasher,	826	57	820	$250			
Canton,	2439	72	2800	250			
Depeyster,	813	38½	619				
Gouverneur,	1430	100	1649	250			$100
Hopkinton,	827	40	617	250			
Lawrence,	1097	58	822	250	6	$100	
Madrid,	1459	500	2346				250
Massena,	2068	88	763	250			300
Morristown,	1600	100	1870	180			320
Russell,	541	45	580	250			75
Stockholm,	1944	120	1924	250			
	23244	718½	22210	2180	6	100	1045

Brasher, 5 bridges; expense of building said bridges, $2500. Expended for making roads, during last five years, $3000. Canton, 3 bridges; one cost $1300, one $400. Gouverneur, 4 bridges. Madrid, 52 bridges. Massena, 3 bridges; original cost, about $3000. Russell, 6 bridges. Stockholm, several bridges: the roads, although of great expense, are bad. Total, 73 bridges. No returns from 13 towns, having 13110 inhabitants.

Steuben County.

Addison,	944	70	1200	250			100
Homby,	1572	50	900	150			
Jersey,	2891	100	1600				
Painted Post,	974	76	1257	250			20
Pulteney,	1724	67	1390	255			
Wayne,	1172	60	825	128			
	8707	423	7172	1033			120

Addison, 2 bridges; money for these 2 bridges raised by subscription. Jersey, 2 bridges. Painted Post, 1 bridge. Total, 5 bridges. No returns from 18 towns, having 25,044 inhabitants.

Suffolk County.

Easthampton,	1668	120	471				
Riverhead,	2010	110	2000				50
	3678	230	2471				50

No returns from 7 towns, having 23,102 inhabitants.

Sullivan County.

Fallsburgh,	1173	80	1268	250			15
Bethel,	1192	120	630	240	9	220	
Thompson,	2457	140	1650	150	20	400	100
	4722	340	2548	640	29	620	115

Fallsburgh, 1834, one bridge cost $600, and a stone one $1500. Total, 2 bridgees. No returns from 6 towns, having 7642 inhabitants.

Tioga County.

Barton,	972	90	1385	25			
Berkshire,	1711	50	720	50			200
Elmira,	2892	65	2300				125
Newark,	1027	65	1100				
Nichols,	1284	60	865				
Oswego,	3076	150	3000		10		250
Richford,		38	897		8	50	15
	11162	518	9767	75	18	50	590

Berkshire, 14 bridges. Elmira, 7 bridges. Newark, 8 bridges. Nichols, a toll-bridge across the Susquehanna. Oswego, bridges are numerous; one of them cost $15,000, and has had $200 expended on it for repairs. Richford, 1 bridges. Total, 26 bridges. No returns from 11 towns, having 22,689 inhabitants.

Tompkins County.

NAME OF TOWN.	Population	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Enfield,	2332	70	1785	250			
Groton,	3597	114	2702				
Hector,	5212	684	5000	80			
Ithaca,	5270	80	4930	611	8	unk'n	
Lansing,	4020	200	2400				250
Ulysses,	3130	85	2120				200
	23561	1233	18947	991	8		450

Enfield, there have been about $35 appropriated to build a bridge. Groton, a tax of $2500 was raised to build a new bridge. Hector, one toll-bridge receives $700 a year. Lansing, 8 bridges. Ulysses, 14 bridges; cost of said bridges $2200. Total, 24 bridges. No returns from 4 towns, having 12,984 inhabitants.

Ulster County.

Esopus,	1770	40	1122				25
Hurley,	1408	40	897	4562	10		
Kingston,	4170	91	2223	250	4¼	800	45
New-Paltz,	5098	180	3350		9	500	250
Plattkill,	2044	79	1485		6¼	215	
Shandaken,	966	24	853		18	unk'n	100
Ellen Ville,		95	2961				285
	11396	549	12871	48121	48	1015	685

Hurley, 6 bridges. Kingston, 2 bridges. New-Paltz, 6 bridges. Ellen Ville, 22 bridges; $400 raised by voluntary subscription for the benefit of a road. Total, 36 bridges. No returns from 8 towns, having 25,154 inhabitants.

Warrren County.

Bolton,	1467	85	1173½				120
Caldwell,	797	44	567	20			
Hague,	721	13	600	150			25
Johnburgh,	985	66	877	250			80
Luzerne,	1362	65	1145	75			15
	5332	273	4392	495			2 40

Bolton, 2 bridges. Caldwell, 5 bridges. Hague, 6 bridges. Johnburgh, 5 bridges. Luzerne, 1 bridge. Total, 19 bridges. No returns from 4 towns, having 6464 inhabitants.

Washington County.

Easton,	3758	90	2891	212			
Granville,	3881	200	3256				1000
Greenwich,	3847		1953				250
Hampton,	1069	80	775				
Kingsburgh,	2606	72	768	100			
Putnam,	718	35	552½				204
Salem,	2972	56	1274				
White Creek,	2446	80	1950				200
	21297	53?	13399	310	2		1654

Easton, 3 bridges, annual expense included in that of roads. Granville, 9 bridges. Greenwich, 5 bridges. Hampton, 3 bridges. Kingsburgh, 2 bridges, expense included in expense of roads. Putnam, 2 bridges. White Creek, 2 bridges, one cost $1500, the other $2000. Total, 26 bridges. No returns from 9 towns, having 21,338 inhabitants.

Wayne County.

Arcadia,	3901	175	3097	100			250
Galen,	3631	105	2500	250			
Lyons,	3603	105	2617				700
Ontario,	1585	40	1447	20			
Rose,	1641	48	1433	80			
Savannah,	886	51	674				10
Williams,	1801	56½	1695				
	17068	581½	13463	450			960

Arcadia, 6 bridges. Galen, 3 bridges, first cost, $1500, second, $600, third, $600. Lyons, 6 bridges. Savannah, 1 bridge. Total, 16 bridges. No returns from 6 towns, having 16,575 inhabitants.

Westchester County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Bedford,	2750	70	2438				50
Cortlandt,	3840	77½	1778	180	4		250
Greenburgh,	2195	44	1460				
New Rochelle,	1274	14	682	20	2½	25	
Rye,	1602	33	842½	25	6	40	40
Somers',	1997	45	1200				250
Westchester,	2362	37		750	12	466	250
Yorktown,	2141	70	1434		4	100	254
	18054	320½	9834½	875	28½	631	1094

Bedford, 7 bridges; $600 have been raised during the last two years, in laying out and altering roads. Cortlandt, 15 bridges. New Rochelle, bridges kept in order by day's work assessed. Somers', 4 bridges. Westchester, 3 bridges. Yorktown, 9 bridges. Total, 38 bridges. No returns from 13 towns, having 18,402 inhabitants.

Westchester County—(continued.)

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.

Yates County.

Barrington,	1854	75	1270				$20

Barrington, 2 bridges. No returns from 7 towns, having 18155 inhabitants.

In the columns of additional money, cost of turnpike, and annual cost of bridges, fractions of dollars are omitted.

From the Cultivator.

AGRICULTURAL REPORT FOR 1835.

The season, as a whole, has been cold and dry, and consequently a late one. Natural vegetation was from ten to fourteen days later than usual. The spring was so dry, that the grasses, sensibly injured by the drought and cold of the winter, did not get their accustomed early growth; and from the scarcity of forage generally experienced, the scanty herbage of the meadows was fed off too late in the spring, as a matter of necessity. They did not recover their accustomed vigor. Winter grain withstood the severities of the winter better than the grasses, looked tolerable well when the spring opened, and maintained their good appearance. Indian corn, which habit has rendered almost indispensable in the economy of our farms, was not generally planted so early, by ten to fourteen days, as in ordinary years, on account of the backwardness of the spring; and it had many subsequent difficulties to encounter, which have tended greatly to lessen its product. The season has been more propitious to other crops, particularly to oats and potatoes. Yet on the whole, the products of our agriculture are less than a medium yield, as is evidenced by their high prices in market.

Wheat, we believe, afforded a fair average yield in most of the districts of secondary formation, where it constitutes the great staple. In other districts the result was less favorable. In the south, the product was seriously diminished by the Hessian fly; while in this vicinity, and to the north of us, the grain worm took at least one half of the crop. The quality of the grain was good; and there has been a manifest improvement, which we hope will continue to progress, in selecting clean seed. The extra price one pays for clean seed, weighs but as a feather against the advantages of a clean crop. Our apprehensions from the grain worm are in no wise diminished. We have tried the preventive means which have been recommended, without any sensible benefit. We hardly know of a more afflicting calamity that could happen to our State, than the extension of this evil, as now experienced here, to our western counties. And what is to prevent it? Is not the subject one of sufficient importance to call for legislative inquiry?

Hay has not been two thirds, and in some districts not one fourth, of an ordinary crop, from the causes which we have in part explained,—the want of the early and the latter rain, and the severe cold of the preceding winter,—causes, which human prudence could neither foresee or guard against. If there is any profitable suggestion which we can make, growing out of the failure of this crop, it is that of renovating old meadows, by subjecting them to the plough and an alternation of crops. So far as our personal observation will serve as a criterion, old grass grounds fell off in their product much more than grounds recently laid down, on our own lands three to one. This disappointment in the hay crop is however likely, we think, to do a vast amount of good—by coercing us to more economical modes of feeding it to our cattle, and to the better husbanding our means—and by extending the culture of roots. The practice of feeding at stacks and in open yards, or even in common racks, where the cattle tread and waste nearly one half of the forage, is giving way to the better system of feeding in mangers, to which the cattle are tied, and where nothing is lost. The stacks and shucks of corn have been better saved, and if cut, as they are in many instances, they are affording an excellent substitute for hay. We give to-day a cut and description of a yard rack, well calculated to promote economy in fodder. The hay cutter is coming into general use.

Indian corn, as we have observed, was planted late, and was very generally and seriously injured by the grub worm. The replanted portion did not come to maturity before the frosts of September 14, 15—the mean temperature of the summer having been some degrees cooler than usual. The frost of the 4th of August also destroyed much in elevated districts, and upon the margins of small streams. Nor were these the only difficulties the crop had to encounter: the warm humid weather of October seemed to saturate the cob with moisture, or to prevent its becoming dry, and caused mouldiness in the grain; and in many cases where this was not fully ripened, absolute putrefaction. This was not only the case at the north, but extensively so as far south as Virginia. We note the fact here, that the reader may compare it with his own practice and its results, that we cut our corn at the ground, before all that had been replanted had become glazed; that it did not mould or sustain injury in the field; but it is due to truth to say, that it required much watchfulness and care to prevent mouldiness after it was husked—constant stirring and exposure,—and that we were obliged to uncrib a quantity, and to spread it, to save it from being injured. We think that corn dries and ripens better in stooks, than in any other situation, even than when topped and left in the hill. In the latter case it is receiving a constant accession of sap from the roots, which, for want of leaves to elaborate it, instead of being beneficial to the grain, serves but to bring on fermentation, as was stated by our Coxsackie correspondent, in the last Cultivator. The experience of the year seems to admonish us,—1. To fit our corn grounds for early planting, by freeing them from excess of moisture, by underdraining, or by ridging, where the surface is flat, or the subsoil tenacious. 2. To plant as early as the temperature of the season will admit. And 3. To select the earliest kind of corn for our crop. We have heretofore recommended a 12 rowed yellow variety, which *we* termed Dutton corn, and so far as we have learnt, this has ripened well where it was planted in ordinary season, and was not destroyed by the grub. The growth is rather dwarfish, but it will the better bear to be planted close; the product is abundant, and the grain hard, heavy and bright. Much of our seed has been sent, during the two last years, to New-Jersey, Pennsylvania and Ohio. We should be gratified to learn the result of its culture in those States, as well as in New-York. On the whole, we do not think the corn crop has been half of an ordinary yield.

Barley, which ranks next in importance to the preceding in the husbandry of many of our counties, has been a good, we think better than an ordinary, crop. On lands which will not carry wheat, and which are neither very light nor very stiff, this is a profitable crop. It gives nearly the same yield as oats, while it sells for nearly double in the market; and it is a question of some doubt, considering its superior nutritive properties, whether it cannot be as profitably raised for horse feed. In many of the eastern countries it is extensively cultivated exclusively for this purpose. The culture of this grain is extending in our State. Barley, for malting, should be threshed with a flail, as the machine, with the awn, often takes off the germinating part, which injures it for malting.

Rye is the bread corn of Germany and Russia, and the *natural* bread corn of many parts of the United States, for we are disposed to adopt, in this case, the opinion of St. Pierre, that every country produces what is most congenial to the wants, and conducive to the health of its population. One great difficulty is in reconciling this axiom with the actual condition of our brethren in some parts of New-England. Wheat they cannot grow,—of corn they grow but a modicum—and rye, they will insist their soil is incapable of producing. Whether this latter difficulty arises from actual sterility in the soil, from the absence in it of the peculiar pabulum of this grain, or from the difficulty of tilling the ground, we do not pretend to say; but the fact will not readily be erased from our memory, that in passing from Worcester in Massachu-

setts, to Enfield in Connecticut, in October, a distance, we believe, of 40 or 50 miles, we did not notice a solitary field of rye or wheat. The puzzle is, what, according to St. Pierre's theory, constitutes the *natural* food of the population? But, to leave this question unsolved, the crop of rye has been good, and the grain heavy. According to Von Thaer, this grain abstracts 30 parts in one hundred of the nutriment contained in the soil where it is grown. It is less exhausting than other small grains, and is ranked next to wheat in its nutritious properties. It contains a substance, in the opinion of Thaer, which facilitates digestion, and has an action particularly refreshing and fortifying on the animal frame.

Oats have been unprecedently fine. The cold season has been propitious to this crop. A large amount was sown, and both straw and grain were heavy. In many cases the crop was not secured till late in September.

Potatoes have, like oats, been favored by a cool summer; and where not cut down by the frost, before they were ripe, the crop has been a very large one. The scarcity of cattle forage and corn, however, will cause heavy requisitions to be made upon the oats and potatoes, to make up the deficiency, and present prices of these articles are likely therefore to be sustained and increased.

Mangel Wurtzel and *Ruta Baga*. The culture of these roots, as field crops, has been greatly extended, and as far as we can learn, with very encouraging success. We are yet hardly well enough versed in the management of these crops, and the labor saving machines which should be used in their culture, to enable us fully to appreciate the advantages they are capable of affording to our husbandry.

Hops have made but a very light return for the labor bestowed in their culture. The crop was light in New-York, and the quality generally inferior, on account of their not having matured well before the arrival of the autumnal frosts.

The dairy has been a source of handsome profit, on account of the high prices which butter and cheese have sustained in the market. This branch of husbandry is being considerably extended among us. It probably affords as sure a profit as any other department of husbandry. The gains may not be the greatest, but they are obtained at the least risk and expense.

Butcher's Meat, though rather scarce and high in the early part of the season, has been abundant and cheap towards the close of the year. The apprehension of a scarcity of fodder has led to the slaughter of a vast number of neat cattle and sheep; and induces an apprehension that both will be high the current year. *Pork* has been rather light, but the article has sustained a very liberal price.

From the Boston American Gardener's Magazine.

Observations on the Dahlia, its Species and Varieties. By JOHN LEWIS RUSSELL, *Professor of Botany and Vegetable Physiology to the Mass. Hort. Soc.*

The surpassing beauty and brilliancy of the dahlia has raised it, in the estimation of the floral taste, whether considered in its single unadorned simplicity, or when brought to the acme of perfection by the ingenious labors of the horticulturist. Scarcely unrivaled by the unique elegance of the camellia, it has become, like that remarkably transmuted plant, as universal a favorite among the curious and wealthy; and still more a companion of the antique and venerable accompaniments of the cottage garden or the village flower-bed, of some humble admirer of nature's sportive wonders, such as may be found in every community, and not by any means few in our own happy, smiling New-England. Perhaps the moral and mental improvement of a people cannot be better estimated, surely not better promoted than in the observation and introduction of the spirit of the love of the more elegant and refined occupations attendant on agricultural pursuits. For my own part, I want no better proof of a feeling and exquisitely sensible mind, even under a rough and rude exterior, than may be observed in a love of nature, particularly that which relates to the care of flowers. A rose-bush, a honeysuckle, a pæony—famed in village love for pharmaceutic worth—a lilac-bush, or even a huge tuft of the singlarly striped "ribbon grass,' preserved by some rustic enclosure from the trespass of those sober, useful, though less intelligent tenants of the farmyard, whose tastes are more alimentary than mental—all denote a higher order of mind, in some tidy housewife, or younger female; and when I discover the highly patronized dahlia, lifting its rich blossoms among the associates of its new and strange locality, to me it proves the gradual developement of a purity of taste and feeling, which, though not incongruous, is not always to be expected in such scenes. From the elevated sandy meadows of Mexico, where, scarce half a century since, they were probably first known, and shortly after were transferred from the Mexican Botanic Garden, the species, and almost innumerable varieties have extended with a greater rapidity and more accompanied admiration over the civilized world, than perhaps any other vegetable. The rich alluvial soils of the south, and the hard rocky lands of the north, are adorned with their cultivation; and with a singular accommodation to circumstances, they evince scarce a preference, in the expansion of their blossoms, for one section than for another. It is presumable, however, that heat is injurious to the perfection of their flowers,—a defect which might be obviated in a great degree by application of more moisture. Naturalization or acclimation cannot speedily, if at all, be expected in our northern latitudes, unless occasionally accidental escape from the effects of frost be deemed such, which has been known in this vicinity in several instances; and a case was mentioned of a root exposed to the winters of several years, protected entirely by the early and deep snows so common in the mountainous regions of New-Hampshire. In the Azores, they are lifted out of the soil at the approach of the winter season, and left exposed on the surface till the returning spring, undoubtedly with the view to give a temporary repose, and secure a greater amount of flowers.

So much has been said and written on the subject of my present remarks, that I can scarcely be expected to offer any thing new; and it is only with the design of presenting your Magazine with a succinct account of the early history and rapid progress of this superb flower, together with whatever observations may suggest themselves, that I undertake the task. Mr. Joseph Sabine, in the third volume of the "Transactions of the Hort. Soc. in London," has drawn up a very able and exceedingly interesting article, embracing all that was known at that time, (1818;) but as it may not be easily available to many of your readers interested in the subject, I shall consider it a sufficient excuse to pursue my intentions.

"The dahlia," says Count Lelieur, "was originally from Mexico, and introduced into Europe in 1789."—"From the Botanic Garden at Mexico, it was sent to that of Madrid, where it flowered for the first time in 1791." Cavanille (an ecclesiastic and eminent botanist,) dedicated the genus to Dahl, a Swedish botanist, a disciple of Linne, and the author of a work on his "Systema Vegetabilium." "In the same year (1791,) he gave the description of three varieties sent from Mexico, which he considered as three *species*, constituting the genus Dahl*ia*, viz: pinnata, rosea, and coccinea," (*Memoire sur le Dahlia*, &c. pp. 3—4.) In the number for March, 1835, of this Magazine, (Vol. I., p. 114,) some observations were made on the restoration of the old name of the genus, given by Cavanille, and altered from erroneous impressions of its being already appropriated, strengthened by a similarity of sound to Dalea, belonging to an entirely different natural order and artificial class. Willdenow, in his *Species Plantarum*, applied that of Georg*ina*, after Georgi, an eminent Russian botanist, and De Candolle adopted it, apparently on such authority.—With a similar desire of imitation, or the universal mania after new names, the florists of this country were fast falling into the supposed *improvement*, regardless of the untenableness of one averred objection, and the gross impropriety of violating that rule of every scientific nomenclature,—that the original name should be sacredly preserved, to the exclusion of every other, unless founded on *good* and *substantial reasons* of real physiological difference. It was with unfeigned pleasure that I therefore hailed the restoration of Dahl*ia*, and trust that the disciples of the illustrious star of northern Europe shall confer honor, and shed some reflected glory on the plant which was dedicated to his fame and memory.

In the third volume of the "Annales du Museum," we find a memoir on the Dahl*ia*, by M. Thouin, accompanied by a colored plate of three varieties, viz.: rosea, purpurea, and coccinea, probably answering, at least in color, to the three species of Cavanille,—rosea, pinnata, and coccinea. M. Thouin remarks that rosea was of the size of Aster chinensis *L.*; and from the plate, it seems to resemble a prototype of "Queen of Naples," a somewhat old variety. One these varieties is figured with semi double flowers,—a fact not a little remarkable, as this plate was issued in 1804, and Count Lelieur mentions that not until 1817 could he obtain even two or three double varieties; about the same time, indeed, that the Dutch florists began to procure theirs from seed. A similar curious fact was observed in the difference of seed raised at Anteuil and St. Cloud, the richer soil producing only pure and simple flowers, whereas the thinner and lighter soils of the former place was only prone to produce the seeds of double varieties—accounted for on the philosophical principle, that it was a greater effort to produce a perfect seed than an imperfect one; that is, one capable of continuing an accidental and physiologically considered monstrous developement of petals instead of stamens.

After several attempts to reduce to species the different varieties of this flower, each botanist and cultivator adopting some trifling character, founded on the form of the leaves, or color of the flower, De Candolle discovered that the essential distinctions consisted in the absence or presence of fertile florets in the ray, and termed, in the second edition of *Hortus Kewensis*, *superflua* and *frustranea*. Mr. Sabine reduces under the two following species of

De Candolle the several synonyms, as quoted from the Hortus Kewensis:

1. *Dahlia superflua*, caule non pruinoso, floseulis radii fœmineis.

2. *Dahlia frustranea*, caule pruinoso, floseulis radii neutris. [*Hort. Kew.*, ed. 2, Vol. v., pp. 87—88.]

By this arrangement it will be perceived that two species are formed, the first with "smooth stem, and fertile florets in the ray;" and the second with a pubescent or "hoary stem, and barren florets in the ray."

How far this arrangement has been observed, I have little means of determining. Loudon, in his *Hortus Britannicus*, gives a catalogue of sixty varieties of D. *superflua*, and only five of *frustranea*. But even with the characteristic differences which Sabine lays down, as to the coarseness of foliage and diffuseness of habit in *superflua*, and the delicacy, compactness and erect manner of growth in *frustranea*, I very much doubt whether in this country it would be easy to detect the species in the astonishing varieties of our gardens. It is almost certain that color would afford no test, although the original color was referable to purple in the former, and that of orange or scarlet in the latter. Still more uncertain the downiness or pubescence of the stems, which, though more or less observable in all, does not seem to constitute a permanent character. A series of experiments should be instituted, in order to endeavor to trace any observance of this specific difference of De Candolle, in the seedlings of our double varieties; and also whether, in this instance, unobserved, a real hybridizing process has not taken place between the two supposed genuine species.

It may be deemed presumptuous to seemingly question the authority of such celebrated names; but it must appear an important, and surely therefore a harmless inquiry, especially when we consider the tendency to confusion in such a myriad host of abnormal individuals, as our catalogues of the varieties of dahlias present. I trust, therefore, to the candor of discriminating minds, that nothing but a deep interest in the cause of scientific truth could for a moment prompt such an inquiry. Such a theory has been conceived before, from the failure of the Genevan botanist's characters, as also from other circumstances, which render it a still more interesting query; and at no better time could it be settled, unless it has already been done, than now, in the height of the universal popularity and general admiration which the subject of it obtains, as an ornament of our gardens and parterres.

It is a curious subject for reflection on the changes effected in horticulture, to be able to trace the opinions of learned men, founded in sound reason and observation, taking, for a moment, the situation they occupied, and casting a glance forward to our own experience and knowledge, which confirms or disproves their theories. Thus De Candolle foretold the improbability of the occurrence of a blue variety, and we have almost every combined shade and primitive color of the prismatic bow, excepting that Mr. Sabine tells us of the existence of a double white, which he feels inclined to doubt, and now "Kings" and "Queens," there are of double white, and even "Mountains of snow," and beauties of antiquity, and unrivaled only by the elegance and purity of these fragile flowers; the grandeur of an avalanche exhibited in a petal, and the winning loveliness of female character shining forth in an abortive stamen.

But with all the attractions of great and good and illustrious names, and the wondrous transmutations of floral skill—for wondrous they truly are—the simple, unadorned elegance of a fine single flower, with its eight perfectly formed petals and golden centre, expanding gradually into the florets of the disk, presents to my ideas a lovely work of nature's skill. Surely it is a mistake to exclude from our collections these primitive forms, to give place to double varieties only; and during the last season, one such has actually insinuated itself, of however only tolerable merit, more it may be suspected from its royal title or foreign origin, than from any returning taste to floral simplicity.

The dahlia, like many other cultivated plants, seems very prone to sportiveness or variation in the tints and pencilings of its petals. Cultivators begin to recommend the use of strong and nutritive manures in producing very fine flowers, an opinion entirely counter to one formerly entertained and practised upon,—that of planting in poor and meagre soils. Undoubtedly the former practice is the better one, and, added to this, the fact, that but a moderate degree of sun and heat is necessary to their increase, there can be no reason why the multiplication of flowers is not almost wholly at the disposal of the grower. The natural localities have been discovered to consist of sandy mountainous meadows, of 48 to 5400 feet above the level of the sea. A sandy meadow, in such a situation, may not be a poor or meagre soil; on the contrary, it is most probably a very rich one, being composed of the alluvial deposit of the decomposition, both mineral and vegetable, of the upper regions. It is certain that the effect of poor soil on the plant is to weaken the tendency to produce rich flowers, by the poverty of its entire growth, and that, when liberally supplied with suitable food and sufficient moisture, nothing can surpass the exuberance of its blooms.

The value of the dahlia seems confined to its intrinsic beauty and hardiness, as an ornamental plant. Many futile attempts have been made to introduce it among the esculent roots; but it would require a savage appetite, or a love for novelty, to bring this about. Its tubes, nevertheless, abound in farina, but the supposed presence of benzoic acid destroys their palatableness. The Compositæ, in their general characters, though of great importance to mankind in their medical properties, offer few articles of nutritious food. The tubes of the tuberous sunflower, improperly and commonly called "Jerusalem artichoke," are indeed considered by some as delicate food, and the disk of the genuine artichoke, is used in some countries extensively as an accompaniment to the table.

Every season brings to the dahlia some new insect foe, which attacks its valuable and tender buds, or devastates its foliage. The grasshopper, (a common green species,) and the *Syrtis crosa*, with *Membracis bubalus*, better known to the unscientific as a two-horned triangular *bug*, has been peculiarly busy for a few seasons past. While some unknown pest, of a green and smooth larva, luxuriously riots on the rich petals, or undermines the leaves. A small dipterous (?) insect was observed for the first time this year, but I was unable to detect any such new depredator. Nothing but a careful examination and diligent use of the fingers in seizing and crushing the intruders, with perhaps some liquid application to the roots, which should promote a more speedy and vigorous growth, is a preventive. It is to be hoped attention will be paid to this view of the subject, that some method may fortunately be devised to save from disappointment the promised glories of our finest and rarest plants, or at least that these insidious mischief-workers may be known and exposed.

I conclude this article with only one question to the experimental florist, viz: whether sufficient experiment has been made, as to the soil or exopsure, to insure the perfection and bloom in that rich and superb variety, "Levick's Incomparable?" Every one who attended the last annual exhibition of the Massachusetts Horticultural Society, must remember a remarkable specimen which graced the magnificent display of its sister varieties, which was produced in the immediate vicinity. Yours,

JOHN LEWIS RUSSELL.

Salem, Jan 1, 1836.

From Chaptal's Chemistry of Agriculture.

CHEMISTRY APPLIED TO AGRICULTURE.

Influence of Heat and Light upon Vegetation.—The changes of temperature experienced by the atmosphere in the course of a year, are so great, as to cause some liquids to pass alternately either to the solid or aeriform state, and some solid bodies to become liquid. The natural effect of heat upon these bodies is, by dilating them, to weaken the force of cohesion which unites their molecules, and, by facilitating the action of chemical affinity, to enable them to enter into combination with foreign bodies. Thus heat renders the juices of plants more fluid, and facilitates their circulation through the cells and capillary vessels; and by giving activity to the suckers of roots, enables them to draw from the earth the juices necessary for their nourishment.

Above a certain temperature, heat, by promoting evaporation, causes the juices of plants to become thickened and dried in their organs, and thus vegetation is arrested, and life suspended. This effect always takes place during great heats, when neither rain, dew, nor irrigation can sufficiently repair the loss occasioned by evaporation.—This effect would be more frequent, if provident nature did not employ means to moderate the action of heat.

The first of these means is the transpiration of the vegetables themselves, which cannot take place without carrying off a large portion of heat, and thus preserving the transpiring body at a temperature below that of the air. The second means is found in the organization of leaves, which are the only parts of a plant where transpiration takes place. That surface of leaves which is exposed to the direct rays of the sun is covered by a thick epidermis, which resists the calorific rays. In herbaceous plants, as in stalks of grasses, this covering is composed principally of silex. In other plants it is analagous to resin, wax, gum, or honey; whilst the epidermis, which covers the opposite sides of the leaves, is fine and transparent. It is by this, that transpiration and the absorption of nourishment from the atmosphere are carried on. If we should reverse the order of things, and present the under surface of a leaf to the rays of the sun, we should very soon see that it would make great efforts to resume its natural position.

When a plant is dead, or rather when an annual plant has fulfilled its destiny, giving assurance of its re-production by the formation of its fruit, the action of heat and of the other chemical agents is no longer modified by any of the causes of which I have just spoken, and the plant receives their im-

pression in an absolute and unmodified manner. When the temperature of the atmosphere sinks below a certain point, the fluids in plants become condensed, the movement of the juices is retarded, the activity of their organs languishes, and is at length suspended, until restored by the return of heat. The action of the atmosphere upon plants, when deprived of its due proportion of heat, is however modified by the emission or disengagement of caloric, which is always given out when liquids are condensed, or solids contracted; and this occasions the temperature of plants, during the winter, to be always a little higher than that of the atmosphere.

It sometimes happens that the temperature of the atmosphere sinks so low as to produce fatal effects upon plants by freezing their sap, and thus occasioning their death. This effect does not always depend upon the intensity or degree of cold to which they are exposed, but upon particular circumstances. I have seen olive trees resist a temperature of 22°.2 Fahrenheit, and perish from that of 28°.6, because in the last case the snow, which had collected upon the branches of the trees during a night, was dissolved the following day by the heat of the sun, and the wet tree was exposed during the succeeding night to the action of 28°.6. There is nothing more dangerous for corn and grasses, than those frosts which follow immediately after a thaw, because the still wet plants, not being deeply rooted in the ground pulverized by the frost, have no means of defending themselves from the effects of the cold.

Though the action of light upon vegetation does not appear to be so important as that of the other fluids of which I have spoken, it is not in reality less so. Plants, which are raised in the shade or in darkness, are nearly or quite without color, perfume, taste, or the firmness of texture of those that are exposed to the direct rays of the sun: and if the luminous fluid does not combine with the organs of plants, we cannot deny that it is a powerful auxiliary in their combinations.

When we reflect upon the influence which the atmosphere exercises over vegetation, and over the principal operations which are carried on in rural establishments, such as fermentations, the preparation of various productions, and the decomposition of some substances, in order to apply them to particular purposes; we are astonished at finding nowhere any of the simple and unexpensive instruments which announce its changes every moment.

I do not propose that delicate and complicated instruments should be provided; but I wish to find on every farm an hygrometer, to ascertain the humidity of the atmosphere, a thermometer to indicate the changes of temperature, and a barometer to determine the weight of the atmosphere. This last instrument would be particularly valuable, as predicting the changes of the weather; the rising of the mercury announces the return of dry weather, and its sinking warns us of rain and storms. We can regard these variations but as signs; but they are signs much more certain than those which country people derive from the changes of the moon.

Properties of Mould.—Land owes its fertility, mostly, if not wholly, to the presence, in a greater or less abundance, of principles analagous to those constituting mould.—These principles are furnished by manures, and by the decomposition of plants; but each harvest causes a diminution of them, a part being washed away by rains, and a part absorbed by the crops which are raised; thus the soil is deprived by degrees of its nutritive qualities, till at length nothing remains but an earthy residuum, deprived of its nourishing juices, and completely barren; it is to restore its fertility that land must be manured afresh, after having yielded several crops.

Dews—Suggestions to render them beneficial to Vegetation.—The aqueous vapors suspended in the air begin to be condensed and precipitated at sunset, and with them is deposited the greatest part of the emanations which have arisen from the earth during the day; these exhalations, though beneficial to vegetation, are almost always injurious to man, and it is not without reason that he fears and shuns the night damps. In southern climates, where the heat of the sun is more intense, and rains less frequent than in northern, vegetation is supported by the dews, which are very abundant. In order that the dews of night may produce their best effects upon vegetation, it is necessary that the soil should unite certain qualities, which it does not always possess.

When the soil is hard and compact, and forms by the action of the air an impenetrable crust, the dew is deposited upon its surface, and evaporated by the rays of the sun, without having moistened the roots of the plants or softened the earth around them; so that of the organs that serve to convey nourishment to the plants, the leaves are the only ones benefitted by the dew, while the roots which are the principal vehicles of nutriment when the plant is fully developed, are not in any degree benefitted by it. It is necessary in such cases, that the soil should be softened, lightened, and divided, so that the air may convey the water with which it is charged, to the roots of the plants, and to every part of the earth surrounding them, to a certain depth; then the plant can imbibe, through all its pores, the reviving moisture; and that which is received by its roots is more lasting than that which it absorbs in any other way, because the roots being sheltered from the direct rays of the sun, evaporation takes place less rapidly, and the moisture is retained, whilst the leaves are speedily dried by the heat. Besides, that earth which is most easily affected by the dews, yields most readily to the action of roots, whether it be to fix the plant firmly by their extension, or to draw from the soil its nutritive properties.

This explains in a natural manner the origin of a custom observed by all agriculturists, and of which all acknowledge the advantage. When vegetables, such as peas, beans, potatoes, and other roots are sowed in furrows at equal distances from each other, the soil in the intervals is hoed, or dug, with the utmost care, and thus rendered light, soft, and permeable to the air, whilst at the same time weeds, which would be hurtful to the cultivated plant by depriving them of nourishment afforded by the ground, are destroyed; and the soil rendered more fit to receive the rain, and convey it to the roots. I do not deny that these benefits are real, but I hold them to be secondary, and subordinate to the advantage derived from opening access to the air, and permitting it to deposit its dews upon the roots, and upon the earth in contact with them.

I have uniformly observed the effect of this method to be equally speedy and favorable in the cultivation of beet roots, and I have never employed any other, to restore their vegetation to its freshness when it becomes yellowish and drooping; in three or four hours it will become of a beautiful green, and the leaves spread themselves out, although no rain may have fallen; and this often when the soil had not contained a single weed. I have observed the same effect produced upon the other culinary roots.

To Farmers.—It is not perhaps generally known that potatoe tops sustain through the winter, a worm very destructive to grain. Mr. Chapman, of Madison, in this county, showed me a few days since, a piece of wheat, on ground where potatoes grew last season, on a part of which the tops were collected together and burnt last fall. Where they were suffered to remain, at least three fourths of the wheat was destroyed by worms: and what they have not destroyed is small and sickly—while the wheat where the tops were removed shows no mark of their ravages.—[Somerset, Me., Journal.]

Applications of Chemistry to the Useful Arts, being the substance of a Course of Lectures delivered in Columbia College, New-York, by James Renwick, Professor of Natural Experimental Philosophy and Chemistry.

I.

ACIDS OF COMMERCE.

1. SULPHURIC ACID.

Authorities.—Parkes. Chemical Essays.
Dumas. Chimic appliquee aux arts.

History.—Sulphuric acid was originally prepared by the distillation of the sulphate of iron, in a mode that we shall have occasion to mention, as still used in manufacturing it for a special use. As this sulphate was known by the name of green vitriol, the acid was called oil of vitriol. It was afterwards discovered that the combustion of sulphur under vessels moistened with water, produced the same result. Finally, after the reception of the modern theory of chemistry, Lefevre and Demerey conceived that the oxidation of the sulphur might be promoted by mixing it with nitre, a salt whose acid is easily decomposed. Their experiment fulfilled their expectations, although their view of the rationale is now known to be erroneous. The operation was at first performed in large glass vessels, but as these are expensive, leaden chambers were substituted, and finally when the several steps of chemical action which occur in the process were investigated, a method was discovered in which the use of nitre might be dispensed with. Nitre is however still employed in most of the manufactories in this country and England.

Rationale.—When nitrous oxide (deutoxide of nitrogen) and sulphurous acid are introduced together into the same receiver, they mix without any chemical action upon each other; but if oxygen be present, nitrous acid gas is at once formed, whose presence will be manifested by a quantity of red fumes. This last named gas will also remain unacted upon by the sulphurous acid, unless they be also mingled with the vapor of water. But when this vapor is mixed with them, the red vapors gradually disappear, and a white crystaline solid is deposited on the sides of the receiver. These crystals are a compound of sulphuric acid, nitric acids and water. This crystaline substance is highly deliquescent, so that if the bottom of the receiver is covered with water, they fall into it and dissolve

with a slight effervescence; the water becomes charged with sulphuric acid, nitric oxide is evolved, and in coming into contact with oxygen is again converted into nitrous acid gas. It is only necessary to supply a new quantity of sulphurous acid, and the formation of the solid substance may be again repeated, and an additional quantity of sulphuric acid obtained.

It is therefore obvious, that sulphuric acid may be formed by burning sulphur in a chamber whose floor is covered with water, and into which nitric oxide is introduced in any manner whatsoever, for the combustion of the sulphur will furnish sulphurous acid, and the spontaneous evaporation of the water the quantity of its vapor which is necessary.

Nitric oxide may be furnished by the action of burning sulphur upon nitre. And on this fact the most usual process depends. It may also be obtained by the action of sugar or of starch upon nitric acid. On the latter fact the new and improved process is founded.

Manufacture by a mixture of Sulphur and Nitre.—The chambers in which sulphuric acid is manufactured are made of sheet lead. They are of a rectangular shape. The bottom is raised about six feet from the ground, and supported by stone flags; the sides and top are sustained by a wooden frame, and a space of about six feet is left between this frame and the walls and roof of the building which contains it. The separate sheets of lead are carefully soldered together, and are united to the frame by clamps of lead soldered to their outer surface.

Single chambers have been constructed of all dimensions, from 5,000 to 100,000 cubic feet, and they have been made of smaller size, but so arranged as to communicate with each other. It does not appear that the exact shape and dimensions which are most favorable have yet been discovered. At any rate, a quantity of sulphuric acid proportioned to the sulphur consumed has never been obtained. A bed of water a few inches in depth is spread over the floor of the chamber. Immediately above this, a door, covered with lead, is placed, by which the materials are introduced. These are sulphur mixed with not less than one-eighth of its weight of nitre. They are placed in a shallow vessel of earthenware or cast-iron, mounted on a wheel carriage, and, after being ignited, are shoved in through the door, which is shut after them. When the combustion is completed, and the acid condensed in the water, the carriage is withdrawn, the residuum taken out of the vessel; it is then charged with a fresh quantity of the mixed materials, and reintroduced after they have been ignited. These successive combustions are continued until the liquid at the bottom of the chamber acquires a density of 1.375 to 1.5.* Beyond the latter limit, condensation is unprofitable, because the attraction of the acidulated liquor for the sulphuric acid diminishes, and nitrous acid gas begins to be dissolved by it. This gas is separated with difficulty, and impairs the useful qualities of the acid.

The liquor having reached the above degree of concentration in the chambers, is removed from them to leaden boilers, where, by the aid of heat, it is further concentrated to 1.7†. Beyond this the concentration cannot be carried in a leaden vessel, for fear of melting the metal.

The acid liquor is therefore next placed in close retorts. These were originally, and are still, in most manufactories, made of glass, and set in an iron sand bath; in them the acid is brought, by the evaporation of the water in which it had been condensed, to the specific gravity of 1.84.‡ This is the greatest strength of the acid of commerce, and is sufficient for all practical purposes.

Glass retorts are liable to frequent breakage, in consequence of the violent agitation with which the separation of the bubbles of steam from the acid is attended. The size of the bubbles may be lessened, and the risk of breaking diminished by the introduction of angular fragments of glass, or strips of platinum, into the retort. But it would be far better to employ, as has been done in some French establishments, retorts of platinum. The only objection to these is their original cost, but when a sufficient capital can be obtained, the cost of the acid is lessened by employing them.

An improvement in this process was effected by Chaptal, who succeeded in making the action of the chambers perpetual, instead of intermitting, by burning the mixture of sulphur and nitre in a separate furnace, directing the current of gases evolved from it through the chamber by means of flues, and forming a draught by means of a chimney. This method is attended with difficulties and a risk of loss, if not carefully managed; but, when well conducted, it gives a larger quantity of acid than the other. The first described method yielded, in its earlier stages, no more than 150 pts. for 100 pts. of sulphur. As it ought to produce 318 pts. of acid at 1.84, more than one half is lost. By more careful management, the product has been raised to 240 pts., but the method of Chaptal has yielded 300, involving a loss of no more than 6 per cent. To give it this superiority, it is however necessary to form the apparatus of several successive chambers communicating with each other; and where the method was most completely successful, the last chamber communicated with the chimney by a sloping channel, along which a stream of water was made to flow. The method of Chaptal, too, is dependent for its results upon the scientific skill of the persons who direct it, and even with every precaution, is not certainly successful.

Improved Method of Manufacture.—The method which is on all accounts the best, is that of Payen. We shall, therefore, describe it in detail.

The chamber of lead has a capacity of about 20,000 cubic feet, and is of the following dimensions:

Length, 50 feet.
Breadth, 27 "
Height, 15 "

From one end of the top two chimnies rise to a height of at least 15 feet. These are about 18 inches square, and communicate with the chamber by water-valves, so constructed as to prevent any return of gas downwards, without interfering with the upward draught, but also capable of being opened for the re-admission of atmospheric air, when the process is completed.

At the opposite end of the chamber, a circular hole of 8 feet in diameter is made in the leaden floor. To this a cylinder of sheet lead is soldered, which rises about 10 inches into the chamber, and projects about 7 feet beneath it. The lower end of this cylinder is turned inwards, and bent up os as to form a circular channel, in which a quantity of acid liquor is constantly kept, for the purpose of preventing the lead from being melted by the burning sulphur. The heat, which is thus prevented from reaching the lead, serves to concentrate the acid liquor.

Within the opening left in the bottom of the cylinder, a circular plate of cast-iron is placed, about 3½ feet in diameter, and slightly concave on its upper surface. Beneath this plate is a furnace, by which it may be heated until it becomes capable of inflaming the sulphur.

The sulphur is introduced by a door made in the side of the cylinder, about 2 feet in height and 18 inches in breadth. At the lower part of this door is a small hole about one inch in diameter.

By the same door a small capsule of platinum may be introduced, which is separated from the plate which receives the sulphur, by an iron tripod.

In the vicinity of the chamber, a steam boiler with its furnace and chimney are placed. This boiler communicates with the middle of the chamber by a pipe 1 inch in diameter, having a plate at its extremity, by which the opening is reduced to a circle of the diameter of ½ inch. The fire surface of this boiler is about 5 square feet.

In order to commence the process, the door in the cylinder and the valves of the chimnies are closed; a fire is lighted in the furnace, and when the plate is so far heated as to inflame a teaspoonful of sulphur thrown upon it, 100 lbs. of sulphur are put in. At the same time the platinum capsule is charged with a mixture of 9 lbs. of nitric acid, and 1 lb. of molasses. From this mixture nitric oxide is disengaged in great abundance, and pouring upon the surface of the sulphur, is speedily mixed with sulphurous acid.

While this action is going on, the water in the steam boiler is heated; at the end of about two hours from the introduction of the sulphur, a stopcock upon the pipe is opened, and the steam permitted to enter the chamber. In a few minutes, a condensation begins, which renders it necessary to admit atmospheric air, in order to prevent collapse. This is done by opening the circular hole in the door by which the charge is introduced.

The injection of steam is continued for an hour after the nitric acid sulphurous vapors are condensed. It is then permitted to condense in its turn. When this vapor

* 40° to 50° of Beaume's hydrometer.

† 60° of Beaume. ‡ 66° of Beaum

is wholly condensed, the door and the valves in the chimnies are opened, in order to give free access to atmospheric air, and when the ventilation is complete, they are again closed, preparatory to a renewal of the operation.

The form of the apparatus may be better understood by the annexed plate. (Fig. 1.)

AABB, section of leaden chamber, whose bottom BB is inclined, in order that the stratum of water CC may be drawn off, after it is charged with acid.

D, cylinder of sheet lead, turned up at the lower end, so as to form a channel, which contains a layer of acidulated liquor, EE.

FF, concave plate of iron for burning the sulphur, which is heated by the furnace G.

H, chimney.

I, valve to prevent the entrance of air.

K, steam-boiler.

LL, pipe which conveys steam from the boiler to the chamber.

M, stopcock.

N, furnace for heating the steam-boiler.

O, capsule of platinum to receive a mixture of nitric acid and molasses.

As many as four charges may be consumed in this apparatus in 24 hours; but it is better to be content with three, or even two. In the latter case, the condensation is more complete, and the product from a given quantity of sulphur, larger; the chamber, also, is less liable to injury.

This method gives, with ordinary care, as large a product of acid as that of Chaptal, say 300 pts. for 100 of sulphur.

The nitric acid is not wasted, for by its action on the molasses, a quantity of oxalic acid is obtained, whose value is more than equal to their joint cost.

Sulphuric Acid, of Nordhausen.—Common sulphuric acid contains water as one of its essential constituents, and is, therefore, a hydrate. But sulphuric acid may also exist uncombined with water. In this state it is solid at ordinary temperatures. The sulphuric acid of Nordhausen is made up of various proportions of hydrated and anhydrous acid; it also contains sulphurous acid, whose presence is accidental. This acid is made at Nordhausen, by the distillation of sulphate of iron, but the details of the process have not been made public. The following method will, however, give a similar product.

Dry sulphate of iron is placed in an earthen retort; the neck of this is luted to a receiver charged to about half its depth with common sulpuric acid, in which the anhydrous acid driven by heat from the sulphate of iron is condensed. In manufactures on a large scale, several globular receivers communicating with each other, would be necessary, and cylinders of earthenware might be substituted for the retort.

Fig. 1.

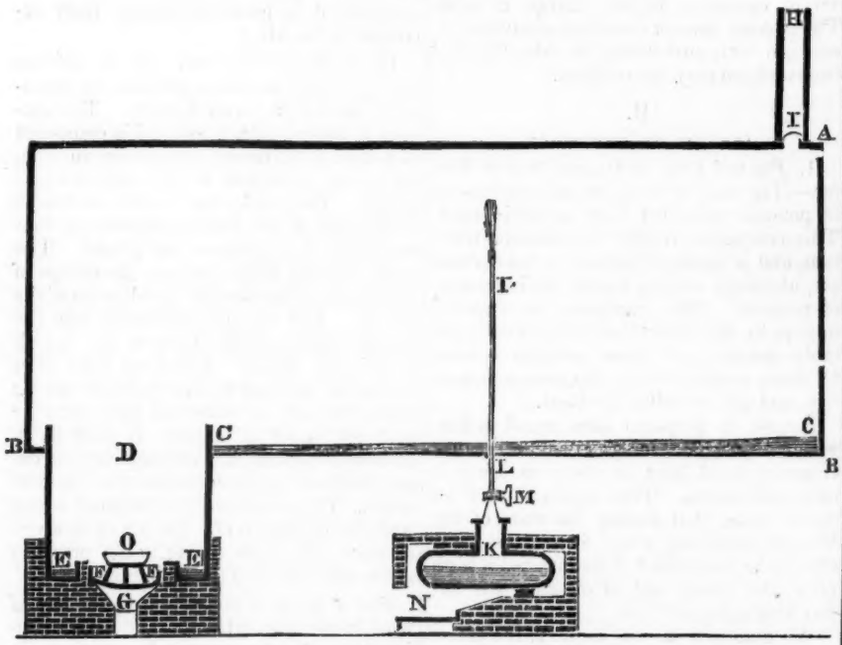
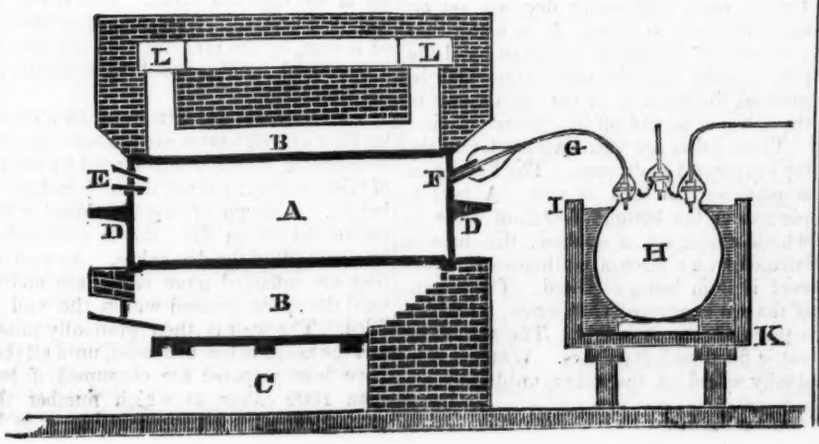


Fig. 2.



2. MURIATIC ACID.

AUTHORITIES.—PARKES. Chemical Essays.
DUMAS. Chimie appliquée aux arts.

History.—Muriatic acid was at first manufactured only on the small scale, and in glass vessels. Vessels of earthenware were next substituted, and to these succeeded retorts of lead. The lead retorts being found incapable of bearing a sufficient heat, were replaced by cast-iron kettles, closed by covers of lead. The last named method is still employed in England. The manufacture of soda from common salt having become a process of much importance in France, a simple and ingenious apparatus was constructed for the purpose of decomposing salt by sulphuric acid. At first, the quantity of muriatic acid gas which was thus set free, was so great that if condensed, it would have been unsaleable; but as the applications of the liquid acid in the arts became more extensive, condensing apparatus were connected with that for the decomposition of the salt.

Manufacture.—The best apparatus for the decomposition of salt by sulphuric acid, is composed of several cylinders of cast-iron. Each cylinder is about five feet in length, and eighteen inches in diameter. The thickness of the metal is about one inch. The cylinders are arranged horizontally and in pairs, each pair being built into a separate furnace, and the flues from ten such furnaces are united in a single chimney. The ends of the cylinders reach the surface of the masonry of the furnace. The two ends of each cylinder are closed by disks of cast-iron, an inch in thickness. Each of these disks has a handle cast upon it, and a small tube cast in an inclined direction. The position of these tubes is higher than the horizontal diameter of the disk, and the inclination towards the interior of the cylinder is downwards. One of these tubes is used for the introduction of the acid, the other conveys the gas to the condensing apparatus.

The condensing apparatus is formed of a number of three necked vessels, similar in form and use to the bottles of Wolf's apparatus. They are arranged in two rows, of twenty each. Each vessel of the first row receives gas from one of the cylinders, by means of a bent tube, and is also connected by bent tubes with the two contiguous vessels, with the exception of the first and last vessel of the row. In the first vessel, the third neck is closed, but the last has a pipe connected with it, which conveys the gas which has not been condensed to the corresponding vessel of the second

row, which becomes first in order. The number of vessels in the second row is the same as in the first, and they are connected by bent tubes in such manner that the gas passes into them in regular succession, until the whole is condensed. The first row of vessels is kept cool by immersing them in a cistern of water; this is slowly changed by admitting cold water at the bottom of the cistern, and allowing the heated water to run off at top. The arrangement of a cylinder and the condensing apparatus may be understood by reference to the annexed plate. (Fig. 2.)

A, cast-iron cylinder.
BB, furnace.
C, ash-pit.
DD, circular disks to close the ends of the cylinder.
E, tubes by which sulphuric acid is introduced.
F, tube to which the glass tubes which convey the gas are luted.
G, glass tube.
H, glass receiver, with three necks.
IK, trough filled with water.
LL, flues.

Each cylinder is charged with 160 lbs. of salt, and to this is added, after the several joints have been closed by luting, 134 lbs. of sulphuric acid, of the density of 1·8.* The furnace must be so constructed that the cylinders shall be completely enveloped in the flame, in order that they may not be broken by unequal expansion. The fire is made as brisk as possible at first, and diminished when the gas comes over freely. At the end of the process the heat is again raised, in order that the residuum may be left in a liquid state, and thus be more easily discharged from the cylinder.

Each of the vessels of the condensing apparatus must be half full of water, which will conduce about 1-5th of its weight of gaseous acid. The purest acid is condensed in the second row of vessels; that which is condensed in the first, contains a little sulphuric acid, and sometimes sulphate of soda, and chloride of iron.

By this method 100 parts of common salt give 130 parts of liquid acid of the density of 1.190†, and the loss is no more than about 9 per cent. By other processes little more than half the quantity is obtained.

3. NITRIC ACID.

AUTHORITY.—DUMAS. Chimie appliquee aux arts.

History.—Nitric acid is prepared in laboratories by the action of sulphuric acid upon nitric (nitrate of potassa.) The first attempt at manufacture on a large scale, was by the decomposition of nitre by means of clay in earthen retorts. Since the improvements in the manufacture of sulphuric acid, the action of this acid on nitre has been also made use of on a large scale.

The best apparatus for decomposition is composed of iron cylinders, exactly similar to those described as used in the manufacture of muriatic acid. Four of these are arranged in a single furnace. The condensing apparatus is composed also of three necked bottles; four rows of these are necessary, the two first of which are immersed in a cistern of water.

The cylinders are charged each with a mixture of nitrate of potassa, and the strongest sulphuric acid of commerce, in the proportion of 100 parts of the former to 60 of the latter. The nitre ought to be purified.

The several joints are luted with clay, which is covered with loam, mixed with horse-dung. The heat must be gradually raised, and well regulated. The process is known to be nearly finished when red fumes no longer appear in the glass tubes; a sudden increase of heat is then given, in order to separate the residue of the acid. The fire is then extinguished, the heads of the cylinders opened, and the sulphate of potassa which remains is easily taken out by iron tongs. The acid condensed in the first row of bottles contains sulphuric acid, and is the least pure. That condensed in the second, and part of the third rows, contains no other impurity but nitrous acid gas, and chlorine. These may be separated by boiling in glass retorts. The acid ought then to be colorless, and have the density of 1·333,* in which state it is brought into the market. The liquor in the last row of vessels is weak, and is placed in a succeeding process in the first and second rows, in order to receive a higher charge of acid. The two last rows of vessels must always be charged with pure water, in order that the condensation may be complete.

II.

ALKALIS OF COMMERCE.

1. *Pot and Pearl Ashes, and Salt of Tartar.*—The basis of these several substances is potassa combined with carbonic acid. This compound retains an alkaline reaction, and is therefore properly a subcarbonate, although usually called the carbonate of potassa. This carbonate is rendered impure by the mixture of earthy and vegetable matter, and some metallic oxides. Of these, potash contains the greatest quantity, and salt of tartar the least.

Potash is prepared from wood ashes, which are made in great quantities in clearing wood land in order to bring it into cultivation. This product is of so much value, that during the wars of the French revolution, when, for reasons hereafter to be mentioned, it maintained a high price, the whole cost of clearing our forests was defrayed by it.

As practised in this country, the art of making potash begins by piling logs in heaps, in the fields whence they are cut. These, when sufficiently dry, are set on fire, and burnt to ashes. It is better that a trench be formed in which to build the pile, in order that the combustion may be gradual, for when it is too rapid a part of the ashes is carried off by currents of air.

These ashes are then lixiviated, and the ley evaporated to dryness. The lixiviation is performed in tubs, or vats. A hole is pierced in the bottom of each of these, to which a spiggot is applied; this hole is covered with a piece of earthenware, to prevent it from being choaked. The bottom of the vat is covered with straw, on which a piece of canvass is laid. The rest of the vat is filled with dry ashes. Water is gradually added to the ashes, until they are thoroughly moistened, in which operation they subside, and the space which is thus left is filled up with water. The whole is left at rest for 12 hours, when the spiggot is withdrawn, and the liquor permitted to escape. The tub is again filled with water, which remains in contact with the ashes for two or three hours, when it is drawn off; and this operation is repeated until the alkaline matter in the tub is exhausted. The weak liquors last obtained are heated and used to lixiviate fresh ashes. The earlier runnings are evaporated in cast-iron vessels having the shape of a portion of a sphere, and which are known by the name of potash kettles. It is more convenient to prepare it for these, in evaporators of sheet-iron, which may also be used to heat the weak liquors, which are to be used a second time in lixiviation. When evaporated to dryness, the lower part of the mass in the kettle is partially fused, and the whole forms a hard cake, which must be broken by a mallet and chisel.

In this form it is packed into casks, and known in commerce by the name of potash. It is of a brown color, owing to the presence of soluble vegetable matter. As it is deliquescent, it is liable to damage from exposure to the air.

Damaged potash, and that of inferior quality, is converted into pearlash by exposing it to heat in an air furnace. This furnace is heated with wood, and is composed of a horizontal hearth covered by an arch, on which the potash is laid, and two fireplaces. The smoke and heated air escape on the side of the hearth opposite to that on which the furnaces are placed. The same opening which permits the escape of the smoke serves for the introduction of the potash. The heat is sufficient to fuse the potash, which would adhere to the hearth were it not stirred. About an hour after the fusion is complete, the vegetable matter takes fire, and is converted into carbonic acid and vapor of water. If chloride of potassa is present, it is decomposed and decrepitates at the commencement of the operation. The substance thus becomes white, with the exception of a few stains of a violet color, which are owing to the presence of the oxides of iron and manganese.

Salt of tartar is prepared from the lees of wine, in countries where that liquor is manufactured. In the several decantations to which it must be subjected, solid matter is left in the tons and casks. This is put in bags and pressed. The paste thus obtained is bent, by the pressure, into the form of a roofing-tile, and is dried upon planks in the sun.

These masses are then burnt on a circular floor of well beaten earth, about six feet in diameter, which is surrounded by a wall of brick without mortar, about 8 inches in height. A faggot of twigs is placed in the centre and set on fire; this is surrounded by about 20 of the dry cakes. As soon as they are inflamed, more cakes are added, until the space inclosed within the wall is filled. The wall is then gradually raised and the heaps of lees increased, until all that have been prepared are consumed, if less than 1000 cakes, at which number the process ceases. The combustion is to be

*65° of Beaume. †22° of Beaume.

*36° of Beaume.

maintained in a regular and steady manner, by varying the quantity of the lees which are added.

The ashes obtained weigh about one-sixth of the weight of the lees employed, and contain about half their weight of carbonate of potassa. They are therefore sufficiently rich to be used, without further preparation, in several arts; but in order to obtain the salt of tartar, they must be lixiviated, and the ley evaporated to dryness.

2. *Barilla, Kelp and Sal-Soda.*—Barilla and kelp contain a carbonate of soda analagous to that of potassa, which is procured from the ashes of wood. They are obtained from marine plants, or those which grow in the immediate vicinity of salt water. Barilla is manufactured from the *salsola soda*, which is cultivated in great quantities on the Mediterranean coast of Spain, for the purpose. The plants, when they have attained their full growth, are cut and dried in the air. They are then burnt in pits about a yard in depth and 3½ feet square. The combustion lasts several days, and the product is a hard, compact mass, partially fused. It is so rich in soda that it is not necessary to lixiviate it, but it may be employed in many of the arts without any further preparation. The quantity of carbonate of soda varies from 25 to 30 per cent.

An inferior quality of barilla is prepared in the south of France, from the *salicorna annua*. This does not contain more than 15 per cent. of carbonate of soda.

Kelp or wareck is made on the north coast of France, and on those of Scotland and Ireland, from sea weed, (*fucus,*) which grows abundantly on the rocks which are within reach of the tide. It does not contain more than from 3 to 5 per cent. of carbonate of soda. It contains, however, a large proportion of the sulphate of soda and potassa, and the chlorides of their metallic bases. It may, therefore, be employed as a substance rich in alkaline matter, under circumstances which will insure the decomposition of the sulphates, and the conversion of the chlorides into oxides. The iodides of potassium and calcium are likewise constituent parts both of barilla and kelp, and the greater part of the iodine used by chemists is obtained from them.

The substance known in the shops as sal-soda or common soda, is usually obtained from barilla or kelp, by lixiviation and crystalization, so conducted as to separate the several soluble matters in the order of their respective solubilities.

The carbonate of soda, which exists in barilla and kelp, has an alkaline reaction, and is composed of one equivalent of soda to two of acid. Another carbonate is used in the manufacture of soda water, which is composed of one equivalent of soda to three of acid. The same salt exists native in Africa, and is known under the name of nation.

The demand for soda in the arts is such, that it cannot be supplied by the ashes of marine plants: it has therefore been obtained from common salt, and the manufacture from this material is now successfully conducted in France.

The first part of the process is the same as that described for the manufacture of muriatic acid. The residuum in the cylinders, after the whole of the acid has been evolved, is sulphate of soda.

To decompose sulphate of soda, various modes have been proposed, but that which has superceded all the others is the invention of a French manufacturer of the name of Leblanc.

PROCESS OF LEBLANC FOR THE MANUFACTURE OF ARTIFICIAL SODA.

AUTHORITY.—DUMAS. Chimie appliquee aux arts.

History.—Sulphate of soda may be converted into sulphuret of sodium by calcination with charcoal. The sulphuret of sodium is soluble in water, and may be converted into bi-carbonate of soda by passing a current of carbonic acid through the solution; for under the influence of that acid, the sodium will decompose the water, and unite with its oxygen. A gentle calcination will cause the bi-carbonate to part with its excess of acid. There are, however, but few cases where this plan could be advantageously employed. Before the French revolution, sulphate of soda was heated in a furnace with charcoal and iron. The product was a fused mixture of caustic soda and sulphuret of iron. But this method is no longer practised.

Rationale.—In Leblanc's process, 1000 pts. of dry sulphate of soda are mixed with 1000 pts. of chalk (*carbonate of lime*), and 550 of charcoal in powder. The proportions are nearly the same as 2 equivalents of sulphate of soda, 3 of carbonate of lime, and 18 of carbon. When these are heated together, the sulphate of soda and two equivalents of the carbonate of lime mutually decompose each other, and become carbonate of soda and sulphate of lime; the latter is decomposed by the carbon, and becomes sulphuret of calcium. This sulphuret being soluble in cold water, and being then reconverted into sulphate, which in such case would act upon the carbonate of soda to produce a double decomposition, the third equivalent of lime is necessary, for this forms with the sulphuret of calcium a compound which is insoluble in cold water.

Manufacture.—The three substances above mentioned, being mixed in the proper proportion, are placed on the hearth of a reverberatory furnace, by means of a door left in the side wall. The mixture speedily begins to fuse and run together in lumps. To prevent the last action, it is well stirred with a rake. So soon as the whole is fused, innumerable bubbles of carbonic oxide escape, and burn as soon as they come in contact with air. The water which exists in the materials is next decomposed, and uniting with sulphur and carbon, yields carburetted and sulphuretted hydrogen, which also burn. So long as these gases are forming, the mixture must be continually stirred; when their escape ceases, the process is nearly completed. The mixture is tested by thrusting a bar of iron into it, and examining the crust which adheres; when this exhibits a homogeneous character, the operation is finished. The fused mass is then drawn from the furnace, and permitted to cool upon the ground-floor of the factory.

If the charge be 800 lbs. of sulphate of soda, and the proper proportions of the other materials, the action lasts about two hours; and about five charges may be acted upon in 24 hours.

The solid matter thus obtained is composed of about equal parts of carbonate of soda, and the compound of sulphuret of calicum and lime. Their joint weight is about 60 per cent. of that of the materials employed; the remaining 40 per cent. has gone off in the form of gas.

The carbonate of soda may be separated by lixiviation and evaporation to dryness. The latter process is performed in an apparatus composed of four boilers placed over the same flue. That which is farthest from the fire is merely used for heating the liquor to the boiling point; in the two next it is concentrated, and in that which is over the fire, the evaporation to dryness is completed.

The dry mass obtained from the furnace in which the decomposition is effected, generally contains some sulphuret of sodium; by exposure to the air this is converted in hypo-sulfite of soda, which is soluble in water, and exists in the product obtained by evaporation to dryness as an impurity. Pure and crystalized carbonate of soda may be obtained by permitting the ley to crystalize in cold weather. The mother waters of this process are evaporated to dryness, and give a soda of inferior quality.

Such is the demand for the artificial soda in France, that it has not been found possible to supply it, and at the same time save all the muriatic acid which is set free in the formation of the sulphate of soda. In many of the manufactories the common salt and sulphuric acid are heated in a reverberatory furnace, and the waste heat is used to heat a second furnace, in which the sulphate is decomposed. Hence the mixed gas and heated air is made to pass into large chambers filled with blocks of quick lime. This serves to condense a part of the acid. From this chamber the smoke is conveyed, by a sloping channel, also lined with quick lime, to a chimney.

When a sufficient quantity of water can be commanded, the fumes are conveyed from the furnaces to a sloping channel, along which a current of water flows, or enter a lofty tower filled with pebbles, over which a small stream of water trickles.

If this manufacture should ever be introduced into this country, the muriatic acid will probably be at least as important a product as the soda; the method of cylinders and condensing vessels of glass will therefore be the most advantageous.

It cannot be doubted that the time is not far distant when these substances will be manufactured to advantage in the United States, probably in the vicinity of our salt springs.

It may also be mentioned that the *salsola* is a native of our maritime coast, and that our extensive salt marshes might probably be applied with profit to its culture.

3. AMMONIA—SAL AMMONIAC.

History.—The ancients were acquainted with a salt brought by way of Egypt from the Temple of Jupiter Ammon, in

Lybia. As this was found in the stables of that temple, it was probably the triple phosphate of soda and ammonia. A substance of different origin, (the muriate of ammonia,) being subsequently brought from Egypt, the name of the former (sal-ammoniac,) was applied to it, for in the infancy of chemical science the two substances were confounded. The manufacture of sal-ammoniac was afterwards introduced into Europe—putrescent animal substances being employed for the purpose of furnishing the volatile alkali. This manufacture received its greatest extension on the establishment of the *abattoir des chevaux*, at Montfaucon, near Paris. Still more recently, large quantities of ammoniacal liquor have been obtained at the works where *gas* is prepared from coal for the purpose of illumination.

Process used in Egypt for the manufacture of Sal-Ammoniac, (Muriate of Ammonia.)

AUTHORITY.—Description d'el Egypte.

Almost the only fuel employed in Lower Egypt is obtained by drying the dung of camels and other animals. In the decomposition of this, by the heat of the fire, muriate of ammonia is formed, which being volatile passes into the chimnies, where it is condensed along with carbonaceous matters in the form of soot.

The soot being collected, is introduced into large globular vessels of thin glass, until they are more than half full. A number of these balloons are then placed in a species of long stove, the opening by which the soot was introduced being placed uppermost. Heat being applied to the bottom of these vessels, the opening is closed as soon as the air contained in them has reached its full expansion. If closed before, the vessel would be broken; and it is necessary, towards the close of the process, to keep this opening free, by an iron rod.

The muriate of ammonia which is sublimed from the soot, condenses on the upper part of the interior surface of the globular vessel, in the form of slender acicular crystals, which, by their aggregation, form a tough, tenacious cake. In this form, it becomes an article of trade. The cakes weigh from 3 to 6 pounds, and are slightly blackened by the carbonaceous matter.

European Process.—In the cities of Europe, the collection of rags forms an object of industry. Those of linen are employed in the manufacture of paper; some of the woolen rags contain colors of sufficient value to make it worth while to extract them; but the greater part are of no other use but to be decomposed by heat, for the sake of the ammonia they are capable of yielding. This decomposition is effected in iron cylinders at a low red heat. The volatile matter which is evolved, is condensed in receivers of glass or earthenware. By condensation about half the weight of the woolen is obtained in a liquid form, charged with an impure carbonate of ammonia, along with an empyreumatic oil, which is of no value. To convert the carbonate of ammonia into muriate, the mother waters left by the crystalization of common salt, which contain muriates of the alkaline earths, (or more properly, chlorides of their bases,) are employed. These are concentrated by boiling to a density of 1.367*, and are then mixed with the ammoniacal liquor in the proportion of 1 to 2. By the double decomposition which ensues, a quantity of muriate of ammonia is formed, which remains in solution in the liquid, while the carbonates of the earths are precipitated in the solid form. The latter are separated by decanting and filtration, and the liquid is evaporated to dryness. In this state, or merely crystalized, it might be an article of trade, but as the form of the Egyptian sal-ammoniac is required by the consumers, it is sublimed in glass balloons, exactly as in the Egyptian process, and it has a superiority over what is obtained from that country, in being of a purer white.

Bones, horn, parings of hides, and almost all other refuse animal matter, whose putrefaction has commenced, when distilled at a low red heat, yield ammonia and its carbonate. The horns of deer, in particular, yield it in a tolerable degree of purity, and were employed in the fabrication of the liquid known as spirits of hartshorn, a name that is still occasionally employed to designate the pure solution of ammonia which is obtained from the decomposition of its muriate.

A sulphate of ammonia has been manufactured by filtering the liquid obtained by the distillation of animal substances through powdered sulphate of lime (gypsum). The sulphate of ammonia is obtained in the solid form by cyrstalization. This sulphate has also been converted into muriate, by mixing it with common salt and subliming. This method has been claimed, by Dr. Ure, for an Englishman of the name of Minish, but it was invented many years since, in Germany, by Wensel.

For the manufacture of the liquid ammonia, the sulphate answers as well as the muriate.

Instead of iron cylinders, tight kilns of brick have been used for the decomposition of the animal matters. Muriatic acid gas may be generated in a similar kiln, by the action of sulphuric acid on common salt. If the two gases be made to meet in a receiver lined with lead, the bottom of which is covered with a few inches of water, the sides and top will be covered with crystals of sal-ammoniac.

The muriate or sulphate of ammonia may be decomposed by quicklime, and gaseous ammonia evolved; or, by the addition of water, the solution of that gas in the liquid may be obtained, and condensed in proper receivers. This process is rather an object of elementary chemistry, than of its application to the arts.

Buffalo, Jan. 12, 1836.

MR. MINOR,—A friend has just loaned me your December No. of the Mechanics' Magazine, in which I find the communication I sent you last September, for the Railroad Journal, upon the plan of constructing Railroads. I regret the necessity of troubling you farther upon this subject, but as I have been so unfortunate as to be wholly misunderstood by you, I have little hopes of better fortune with your readers, without farther explanation.

In your prefatory note to the article, you say my plan of constructing Railroads "will be found useful in many parts of the country, *for passing soft or marshy ground.*" Now, so far from this, the plan *will never answer for such ground, under any circumstances*, nor was it ever intended it should. The present method of building, upon such ground, wants no improvement; and if it did, this structure could never be sustained upon it.

40° of Beaume.

Again, you say it may be useful "for the construction of cheap roads." If the plan has any merit, it is that of giving, *at a medium price, a better road than any of the plans now in use*—whatever their cost of construction.

In specifying the proper kinds of timber, you have printed "beach, cedar, and locust." I wrote "*red* beach," &c., as some varieties of that wood will not survive a single year's exposure, without marks of decay. Respectfully, yours,

R. W. HASKINS.

Note.—I requested that two or three copies of the article might be sent me, when published, but none have come to hand. I should still be glad of them, as also, of such remarks, if any, as you may publish thereon, from other pens. Did the article appear in the Railroad Journal, for which work it was sent you? It was for the readers of *that* work, more particularly, that I designed it, &c. R. W. H.

We feel grateful to those who contribute descriptions of useful inventions, in relation to Railroads, and therefore give the above explanation, as a matter of justice to our correspondent—with the remark that, from a single perusal of his first article, we formed the opinion expressed. If it was erroneous, our readers would surely not be led astray by it, as they usually form their own opinion from the facts, without regard to ours. We regret exceedingly that he did not see the number of the Journal in which it was published, and can apologise for the omission only by saying to all who require extra copies of the Journal, that we are too *poor* to pay for the *engraving*, and then send duplicate copies of it to gentlemen who think enough of the work to desire their plans and inventions to appear in its columns, yet not enough to aid in sustaining it by subscribing for it. When they shall, as we, have devoted all their leisure hours for *four years*, and expended *three thousand dollars*, over and above the *entire receipts* in return, to establish a work which shall aid and promote the works of Internal Improvement of the country, without receiving a penny for their pains, then, perhaps, a community of feeling may exist, which will induce us to procure engravings, publish their descriptions, and then send the work, gratis.

It may be said, and perhaps with truth, that the investment was injudicious. We *believed* it perfectly good—and do not now doubt but that it would eventually have proved so, if we had not had the misfortune to lose almost our entire stock of back volumes and printing materials, worth over *five thousand dollars*, by the late conflagration. *Now it is an entire loss*, and therefore every person interested *in*, or connected *with*, Railroads, is solicited to aid in sustaining the work, not only by his own subscription, but also by inducing others to *be alike*—wise. Its Editor, like old "*England expects every man to do his duty*," by forwarding a few *additional* subscribers as early as possible, with the *advance* subscription.

☞ This number of the Farmer has been delayed quite too long. I shall endeavor to issue number 3 by the 1st of *April*.

I sent bills in the January number for all balances due, and for the current year in *advance*. Those who have *already* remitted the money, will please accept my thanks for their attention. Those who have not remitted, but intend to do so soon, will oblige me by *early* attention to the subject, as I *still* feel the effects of the *scorching* of December 17th.

Any one receiving the Farmer, who does *not* intend to remit the *balance* due previous to the first of January last, will please to *return* the numbers, free of postage, as they will now be of some use to me.

A list, by way of duplicate receipt, will be published on the cover of the next number, of those who have paid in advance. It enables both parties to understand the accounts, and to correct errors.

THE APPENDIX.—Some few of our subscribers have complained at not having received the Appendix to the *Farmer* during the past year; saying that they had paid to our *agent*. Instances have occurred where payments have been thus made to the *agent*, who, thinking the amount so small that he would delay remitting until he could add more to it; and thus the subscriber has been deprived of the Appendix, inasmuch as we have not hitherto sent the APPENDIX without first having received the year's subscription.

Some others have complained because they could not have the Appendix on paying at the end of the year—a course manifestly wrong, as it was offered and is *given* as an inducement to pay in advance. We are, however, now compelled to balance all claims to the *Appendix* to *previous* volumes, as they were *all destroyed* by the late fire.

☞ The *Appendix* is delayed until the Farmer shall appear on the first of each month, its proper time.

TO CORRESPONDENTS.

I desire to publish the next, or March number of the Farmer by the 1st of April, and therefore solicit your favors as early as possible—not *later*, certainly, than the 25th inst.

MECHANICS' MAGAZINE, Vol. 7—No. 1 & 2, for January and February—No. 1 was published in February—No. 2 is now ready for delivery, having been delayed by the difficulty of replacing the printing materials, which were entirely destroyed.

To make amends, however, for the delay, I have made arrangements for the ensuing year which must render the work valuable. Professor RENWICK, of Columbia College, has consented to prepare for publication, in the Magazine, the substance of a course of Lectures (to be illustrated with engravings) on the "Application of Chemistry to the Useful Arts," delivered in Columbia College. Professor GALE, of the New-York University, has also consented to furnish a series of articles on various subjects for the work—some of which will be of special interest to the citizens of New-York, having for their object to show the errors and folly of the present style of Roofs to the buildings in this city.

It is my intention to give in the Magazine, in the course of the current year, NICHOLSON'S Treatise, called the "Student's Instructor in drawing and working the Five Orders of Architecture," with over forty engravings. This work cannot fail to be useful to those who cannot readily obtain the more expensive works on Architecture. In order that this treatise may be of the most possible benefit to the readers of the Magazine, I shall publish a "Glossary of names and terms used in Architecture," together with the article "BUILDING," from the "Encyclopedia Britannica," and some extracts from the History of Architecture, from the same work, by WM. HOSKINS, F. S. A.

The Magazine is hereafter to be considered as the organ of communication with the public, of the MECHANICS' INSTITUTE of New-York, and will be called the MECHANICS' MAGAZINE AND JOURNAL OF THE MECHANICS' INSTITUTE." No effort will be spared to render the work both interesting and useful.

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